















JOURNAL  
OF THE  
NEW YORK  
ENTOMOLOGICAL SOCIETY

Devoted to Entomology in General



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Volume XXX, 1922

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NEW YORK  
PUBLISHED BY THE SOCIETY  
QUARTERLY  
1922

PRESS OF  
THE NEW ERA PRINTING COMPANY  
LANCASTER, PA.



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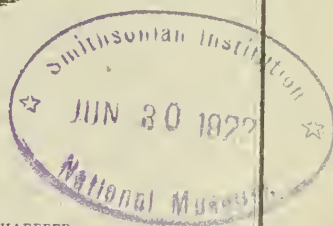
MARCH, 1922.

Edited by HOWARD NOTMAN

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Published Quarterly by the Society.

LANCASTER, PA.

NEW YORK CITY.

1922.

[Entered April 21, 1904, at Lancaster, Pa., as second-class matter under Act of Congress of July 16, 1894.]

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# JOURNAL

OF THE

## New York Entomological Society.

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VOL. XXX.

MARCH, 1922.

No. 1

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### NEW RECORDS AND SPECIES OF SOUTH AMERICAN MEMBRACIDÆ.

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In a large collection of specimens of South American Membracidæ, most of which were collected by Mr. H. L. Parish of Toronto, the following species are new, or are here recorded for the first time since their original descriptions, or are species of which the types were from unknown localities, or are species the synonymy of which has been in doubt. The types and paratypes of all new species are in the writer's collection.

#### Subfamily **Membracinæ**.

##### **Membracis rosea** Fairmaire.

1846. *Membracis rosea* FAIRM. Ann. Soc. ent. France, IV: 246, 9, Pl. 4, f. 24.

1851. *Membracis rosea* WALK. List Hom. Brit. Mus., 476, 13.

1903. *Membracis rosea* BUCKT. Mon. Memb., p. 36.

One male taken on the Napo River, Peru, June 7, 1920 (Parish).

##### **Membracis zonata** Fairmaire.

1846. *Membracis zonata* FAIRM. Ann. Soc. ent. Fr., IV: 248, 17, Pl. 4, f. 17-19.

1851. *Membracis zonata* WALK. List Hom. Brit. Mus., 478, 21.

Four females taken at Teffe, Brazil, Feb. 1, 1920 (Parish).

##### **Enchenopa bifenestrata** new species. (Pl. I, fig. 1.)

Head foliaceous, twice as long as wide, slightly convex, closely and finely punctate, densely pubescent with short silvery hairs; base sinuate; eyes large,

prominent, brown; ocelli small, conspicuous, opalescent, twice as far from each other as from the eyes and situated well above an imaginary line drawn through centers of eyes; clypeus very large, subrectangular, apex rounded, extended for more than half its length beyond the margins of the genæ.

Pronotum foliaceous, much compressed, reddish-brown except for white translucent areas near anterior and posterior margins, finely punctate, sparingly pubescent, elevated in front to form a flattened porrect pronotal horn; horn short, compressed, nearly triangular, a strong ridge starting at the apex and extending down each side for about one third the length of the horn, at which point it branches, one branch extending forwards and downwards in the direction of the eye but ending in about the middle of the metopidium, the other extending backwards over the humeral angle and reaching the margin of the pronotum at a point about one third the distance from the humeral angle to the apex of the posterior process; foliaceous part of horn deeply compressed in center to form a translucent whitish linear area extending from tip of horn to head; foliaceous posterior margin of pronotum with a similar translucent area becoming wider posteriorly and extending about halfway to apex of posterior process; posterior process foliaceous, gradually rounded above, a small reddish translucent spot before apex, apex decurved, sharp and not reaching tips of tegmina.

Tegmina dark brown and coriaceous for basal two thirds, apical third hyaline; base finely punctate and sparingly pubescent, apical margin wrinkled.

Under surface of body uniformly reddish-brown; femora and tibiæ darker brown; tibiæ widely foliaceous and sparingly pubescent; tarsi yellow.

Length from front of head to tips of tegmina 3.7 mm.; from tip of pronotal horn to tips of tegmina 4.8 mm.; width between humeral angles 1.7 mm.

Type: male.

Locality: Para, Brazil. July 30, 1919 (Parish).

Small reddish-brown species with short, blunt, nearly erect pronotal horn; the anterior and posterior margins of the pronotum very foliaceous, white and almost transparent; two ridges on each side of the horn; elytra brown and coriaceous for basal two thirds, apical third hyaline.

***Enchenopa pulchella* new species. (Pl. I, fig. 2.)**

Head foliaceous, longer than wide, densely pubescent with long golden hairs; base gradually rounded; eyes small, gray tinged with red; ocelli translucent yellow, inconspicuous, farther from each other than from the eyes and situated well above a line drawn through centers of eyes; margins of genæ rounded; clypeus pilose, apex rounded, extending for more than half its length beyond margins of genæ.

Pronotum much compressed above, strongly punctate, sparingly pubescent;

anterior horn short and blunt, projecting forward and upward with a single strong ridge in the middle of each side which continues downward and backward over the humeral angles and reaches the lateral margin of the pronotum; anterior and posterior portions of horn very foliaceous; a black line extending from tip of horn to humeral angles; another black line following the ridge throughout its course and becoming wider at lateral margin; a small black spot on the margin midway between this ridge and the apex of posterior process; tip of posterior process black; all the rest of the pronotum bright scarlet. Posterior process gradually arcuate, tip depressed and sharp, reaching just about to the tip of the abdomen but not reaching the apices of tegmina.

Tegmina hyaline with a black transverse band across center and with base black, opaque, pubescent and punctate.

Under surface of body black; legs entirely red.

Length from front of head to tips of tegmina 4 mm.; from apex of pronotal horn to tips of tegmina 5.1 mm.; width between humeral angles 2 mm.

Type: male.

Locality: Napo River, Peru. June, 1920 (Parish).

Small brilliant scarlet and black species; horn short and projecting forward; tegmina hyaline banded with brown; legs red; under surface of body black.

***Tropidoscyta immaculata* new species. (Pl. I, fig. 3.)**

Head longer than wide, brown, very finely punctate, closely pubescent with silvery hairs; base sinuate; eyes large, conspicuous, yellow; ocelli large, conspicuous, yellow, farther from each other than from the eyes and situated above a line drawn through centers of eyes; genæ rounded; clypeus extending below margins of genæ, rounded and pubescent at tip.

Pronotum not foliaceous, uniformly light brown, finely punctate, closely pubescent with fine silvery hairs; anterior produced forward in a blunt point; a long well-defined ridge on each side extending from tip of point downwards and backwards over the humeral angles and ending at the lateral margin of the pronotum; two or three faint ridges extending from this ridge downwards over the metopidium; dorsal margin of prothorax sinuate; median carina percurrent from head to tip of posterior process and very sharp; posterior process gradually acuminate, reaching just to the internal angles of the tegmina and about as far as the apex of the abdomen.

Tegmina opaque flat yellow; basal costal cell coriaceous and punctate, apex slightly wrinkled; five apical and three discoidal cells.

Legs and under surface of body uniformly light brown and densely pubescent.

Length from front of head to tips of tegmina 3.7 mm.; from anterior tip of pronotum to tips of tegmina 4.5 mm.; width between humeral angles 1.7 mm.

Type: male.

Locality: Chaco de Santiago, Del Estero, Rio Salado, Argentine Republic.

Small, without spots or markings of any kind; prothorax, body and legs concolorous light brown; tegmina opaque yellow; anterior pronotum produced forward in a blunt point.

***Tropidoscyta albipes* new species.** (Pl. I, fig. 4.)

Head much longer than wide, very convex between the eyes, shining reddish-brown, densely pubescent with long silvery hairs; base almost straight; eyes large, prominent, dark brown; ocelli pearly, conspicuous, twice as far from each other as from the eyes, situated well above a line drawn through centers of eyes and less than their own diameter from the margin of the pronotum; margins of genæ rounded; clypeus as long as wide, extending for more than half its length below inferior margins of genæ, tip rounded and very pilose.

Pronotum broader than high, not compressed, not produced in front, rich reddish-brown with white markings, closely punctate, sparingly pubescent; metopidium convex; median carina strongly percurrent and very sharp; two lateral ridges, the first high, sharp, curving above the humeral angle, higher than the median carina just above the humerals extending downward and backward to the lateral margin of the pronotum about halfway between the humeral angles and the tip of the posterior process, the second ridge much smaller, extending from the humeral angle almost directly forward across the metopidium; a broad white fascia beginning at the highest point of the upper ridge, extending downward to the humeral angle, then backward along the margin of the pronotum to the base of the ridge which it follows upward for a short distance; a semicircular white spot on the dorsum at the base of the posterior process; posterior process long, heavy, tectiform, suddenly acute, extending slightly beyond the internal angles of the tegmina and just reaching the tip of the abdomen.

Tegmina hyaline, wrinkled, base brown, punctate and pubescent; three small black spots in center just below base of pronotal ridge, decreasing in size from above downwards; veins prominent and strongly pilose; five apical and three discoidal cells; tip clouded with fuscous.

Under surface of body rich reddish-brown, sparingly pubescent; legs and feet entirely white; hind tibiae with very minute black spines.

Length (female) from front of head to tips of tegmina 4 mm.; width between humeral angles 2.2 mm.

Length (male) 3.2 mm.; width 1.5 mm.

Type: female. In addition to being smaller, the male is slightly darker on the under surface. Otherwise the markings and sculpturing is the same.

Locality: Flores, Manaos, Brazil. Nov. 7, 1919 (Parish).

Small brown and white species; upper lateral ridge of pronotum higher than dorsal ridge above the humeral angles; tegmina hyaline marked with brown; posterior process extending slightly beyond internal angles of tegmina; legs and feet entirely white.

**Tropidoscyta minuta** new species. (Pl. I, fig. 5.)

Head longer than wide, ferruginous, coarsely punctate, sparingly pubescent; base arcuate; eyes large, brown; ocelli very small, pearly, inconspicuous, twice as far from each other as from the eyes and situated well above a line drawn through centers of eyes; margins of genæ sinuate; clypeus subquadrate, longer than wide, extending for more than half its length below inferior margins of genæ, tip pointed and pilose.

Pronotum uniformly ferruginous except base of posterior process which is somewhat lighter in color, not foliaceous, not produced in front, coarsely punctate, sparingly pubescent with short golden hairs; metopidium convex; dorsum subarcuate, highest in front; median carina strongly percurrent, somewhat compressed laterally at base of posterior process; two lateral ridges on each side above humeral angle, the upper ridge being the longer; neither ridge quite reaching the median carina above or the lateral margin of the pronotum below; posterior process short, heavy, acute, tectiform, reaching just to the internal angles of the tegmina.

Tegmina broad, opaque except at the tips which are hyaline, base black, coriaceous, coarsely punctate and sparingly pubescent; two broad black transverse lines across center of tegmen, the areas between these lines a flat opaque brown; veins inconspicuous; five apical and three discoidal areas.

Under surface of body dark brown, swollen and globose, the abdomen projecting below the costal margins of the tegmina; legs ferruginous; hind tibiæ strongly spined.

Length 2.7 mm.; max. width 1.5 mm.

Type: female.

Locality: Obidos, Brazil. Sept. 10, 1919 (Parish).

Very small, heavy-bodied, subglobose, ferruginous; strong median carina; two lateral ridges on each side; base of posterior process lighter in color than the rest of the pronotum; posterior process just reaching internal angles of tegmina; tegmina brown mottled with black with apices hyaline; under surface dark brown; legs ferruginous.

**Leioscyta trimaculata** new species. (Pl. I, fig. 6.)

Head flat, foliaceous, subquadrate, brown, finely punctate, sparingly pubescent with long golden hairs; base angular; eyes large, prominent, yellow; ocelli small, yellow, inconspicuous, farther from each other than from the eyes and situated above a line drawn through centers of eyes; margins of

genæ nearly straight; clypeus very broad, projecting for nearly half its length below inferior margins of genæ, tip broadly rounded and pilose.

Pronotum very dark brown, closely punctate, sparingly pubescent; produced anteriorly upward and forward in a somewhat flattened blunt point; three light yellow or sordid white spots, one on the median anterior margin of the pronotum just below the apex of the process, one on the median dorsal line at the posterior base of the process and just back of the humeral angles, and one near the tip of the posterior process; median carina percurrent and very sharp; humeral angles not produced; posterior process gradually acute, tectiform, reaching just beyond the internal angles of the tegmina and about to the tip of the abdomen.

Tegmina ferruginous, subhyaline; the base and the basal costal cell coriaceous and strongly punctate; an indistinct wide brown fascia extending obliquely across the apical half; tip lighter just above apex; veins prominent, somewhat pilose; five apical and two discoidal cells.

Legs and under surface of body uniformly ferruginous-brown; first and second tibiæ very foliaceous and strongly pubescent with long golden hairs; hind tibiæ not foliaceous, armed behind with strong spines.

Length from front of head to tips of tegmina 5.7 mm.; from apex of pronotum to tips of tegmina 7.2 mm.; width between humeral angles 2.6 mm. Type: female.

Locality: Iquitos, Peru. April 16, 1920 (Parish).

Allotype from Flores, Manaos, Brazil, Nov. 7, 1919. The male is considerably smaller than the female but the markings are the same. Paratypes from Prata, Brazil, July 5, 1919, and from Iquitos, Peru, collected April 21, 1920. In one of the paratypes the margins of the light areas are not so well defined as in the type.

Large, very dark brown with three yellowish spots, one on the front of the pronotum, one on the median line just behind humeral angles and one just before apex of posterior process; pronotum produced anteriorly in a blunt point; tegmina ferruginous and brown; under surface and legs brown.

***Leioscyta ferruginea* new species.** (Pl. I, fig. 7.)

Head slightly convex, subquadrangular, brown, finely punctate, closely pubescent with very short silvery hairs; base arcuate; eyes very large, black, shining, conspicuous; ocelli large, yellow, conspicuous, twice as far from each other as from the eyes and situated well above a line passing through centers of eyes; margins of genæ straight; clypeus large, very broad, extending for more than half its length below inferior margins of genæ, tip semicircular and pilose.

Pronotum entirely ferruginous except a small subhyaline spot just before apex of posterior process; finely punctate, sparingly pubescent; somewhat



swollen just above humeral angles; humeral angles not prominent; anterior pronotum produced upward and forward in a blunt point with rounded apex; median carina percurrent, very sharp and somewhat foliaceous on posterior two thirds of pronotum; posterior process short, gradually acuminate, reaching slightly beyond internal angles of tegmina and just about to tip of abdomen.

Tegmina ferruginous; subhyaline; slightly lighter in color at apex just above the tip; base and basal costal margin coriaceous, punctate and pubescent; veins prominent, somewhat pilose; five apical and two discoidal cells.

Legs and under surface of body concolorous ferruginous; first and second tibiæ very foliaceous; hind tibiæ not flattened, armed with short black spines.

Length from front of head to tips of tegmina 4.8 mm.; from apex of anterior pronotum to tips of tegmina 5.6 mm.; width between tips of humeral angles 2.4 mm.

Type: female.

Locality: Flores, Manaus, Brazil. Nov. 7, 1919 (Parish). Paratypes from Parintius, Brazil, Oct. 3, 1919.

Large, concolorous ferruginous except a faint whitish spot just before apex of posterior process; pronotum produced forward in a blunt point; median carina sharp and compressed, but no other ridges on pronotum; tegmina ferruginous, somewhat lighter at apex above the tip; legs and under surface of body entirely and uniformly ferruginous.

**Hypsoprora albopicta** new species. (Pl. I, fig. 8.)

Head twice as long as wide; entirely covered with a snow-white tomentose secretion with scattered black points; base arcuate; eyes very large, prominent, brown; ocelli very large, prominent, shining amber, translucent, more than twice as far from each other as from the eyes and situated well above a line drawn through centers of eyes, less than their own diameter from inferior margin of pronotum; margins of genæ straight, apices produced in sharp triangular points; clypeus very large, longer than wide, white with black points, extending for more than half its length beyond inferior margins of genæ, widest at center, sinuate on each side, tip pointed and pilose.

Pronotum dark brown, very coarsely punctate, sparingly pubescent, irregularly marked with snow-white tomentose patches which extend transversely across the pronotal horn and longitudinally over the shoulders and down the posterior process; pronotal horn nearly as long as the body, slender, uniformly cylindrical, very slightly compressed above middle, anterior and posterior margins armed with fine teeth, tip slightly expanded on each side; metopidium convex; median carina strongly percurrent; posterior process long, heavy, narrowest in middle, swollen at apical end which is faintly tricarinate, greatly decorated with white, tip acute and just reaching apices of tegmina.

Tegmina dark ferruginous, long, narrow, semiopaque, base coriaceous and punctate, veins very indistinct and somewhat pubescent.

Sides of prothorax, mesothorax and metathorax behind the eyes snow-white with fine black points; under surface of body white except apical end of abdomen which is brown in the female in the neighborhood of the ovipositor; in the male entirely white. Legs white with prominent black dots. All three pairs of tibiae foliaceous but the first two pairs the most flattened. Tarsi flavous.

Length from front of head to tips of tegmina 4.7 mm.; from apex of pronotal process to tips of tegmina 7.6 mm.; height of pronotal horn from top of head 4.3 mm.; width between tips of humeral angles 1.8 mm.

Type: female. The male is considerably smaller but the shape, sculpture and markings are the same.

Locality: Prata, Brazil. July 12, 1919 (Parish). Allotype from Iquitos, Peru, March 16, 1920.

Near *Hypsoprora anatina* Fowler, but differing in the shape and sculpture of the pronotal horn.

Small, slender-bodied, dark brown but densely covered with white tomentose patches; pronotal horn long, slender, uniformly cylindrical without protuberances; posterior process reaching apices of tegmina; tegmina ferruginous-brown; legs snow-white with black dots; tarsi flavous.

I have waited to secure both sexes before describing this species on account of its similarity to *H. anatina* Fowler.

#### **Spongophorus lividus** Buckton.

1903. *Spongophorus lividus* BUCKT. Mon. Memb., p. 8, Pl. 15, fig. 3.

One female from Iquitos, Peru, easily recognizable from Buckton's figure, although his description is inadequate. Taken by Mr. Parish April 21, 1920.

#### **Spongophorus nodosus** Buckton.

1903. *Spongophorus nodosus* BUCKT. Mon. Memb., 79, Pl. 14, figs. 4, 4a, 4b.

One male from Napo River, Peru, June 7, 1920 (Parish). A very remarkable insect. The locality of the type was unknown.

#### **Spongophorus foliatus** new species. (Pl. I, fig. 9.)

Head twice as long as wide, roughly sculptured, scabrous, finely punctate, sparingly pubescent, ferruginous with linear markings of white; lateral margins



nearly straight; base regularly arcuate; eyes very large, prominent, brown; ocelli large, conspicuous, amber-colored, translucent, much farther from each other than from the eyes and situated about on a line drawn through centers of eyes; margins of genæ projecting at first straight downwards and then turning inwards at a sharp angle to meet the clypeus; clypeus twice as long as wide, extending only a short distance below inferior margins of genæ, tip rounded and strongly pilose.

Pronotum concolorous light ferruginous, roughly sculptured, coarsely punctate, irregularly pilose with short, scattered bristle-like hairs; produced upward in two dorsal horns, the first long, sinuate and foliaceous, the second short, erect and nodose; anterior horn arising from just back of humeral angles, at first erect and turriculate, then extending upward and backward as a broad, compressed, foliaceous, sub-oval plate, then suddenly narrowed to form a short process compressed at right angles to the plate and extending upward and only slightly backward; posterior horn erect, subturriculate, consisting of three rather distinct globular nodes, the basal node broad and somewhat flattened, the middle node globose and smaller, the upper node very small and touching the inferior margin of the foliaceous plate of the anterior horn; posterior process short, heavy, flattened, angular, obliquely truncate at tip which reaches to a point about halfway between the internal angles and apices of tegmina.

Tegmina long, narrow, ferruginous, basal half opaque, terminal half subhyaline; veins prominent.

Under surface of body ferruginous-brown; legs ferruginous; all three pairs of tibiæ broadly foliaceous, the middle pair the broadest, all tibiæ showing large, irregular sunken punctures.

Length from front of head to tips of tegmina 8 mm.; length of anterior horn from top of head 9 mm.; width between humeral angles 2.3 mm.

Type: female. Male agrees except in size which is smaller.

Locality: Obidos, Brazil. Aug. 23, 1919 (Parish).

Large, very light ferruginous, concolorous, roughly and coarsely punctate, pilose; anterior pronotal horn at first erect and turriculate, then extending upward and backward as a broad compressed plate, then upward as a narrow process bifid at the tip; posterior horn consisting of three globular nodes, one above the other, decreasing in size from below upwards, the top node touching the foliaceous plate of the anterior horn; posterior process short, flattened, angular, obliquely truncate, reaching beyond the internal angles of the tegmina but not extending to their tips; tegmina uniformly ferruginous, veins prominent.

Subfamily **Hoplophorinæ**.**Umbonia lutea** new species.

Head small, roughly sculptured, convex, irregularly punctate, sparingly pubescent, yellow with an irregular black fascia across base, another transverse black fascia connecting the ocelli and another at base of clypeus; basal line sinuate; eyes large, prominent, bright yellow; ocelli small, yellow, not conspicuous, elevated on a slight transverse ridge, nearer to each other than to the eyes and situated about on a line drawn through centers of eyes; margins of genæ flattened, projecting and curved; clypeus longer than wide, swollen at tip, longitudinally ridged in center, extending for more than half its length below inferior margins of genæ, very pilose, tip rounded.

Pronotum concolorous yellow, very coarsely and regularly punctate, sparingly pubescent; produced in median dorsal spine which is nearly straight, slender, quadricarinate, much inclined backwards, very sharp, apical two thirds black; humeral angles prominent, triangular, edged with black; metopidium broadly convex with a smooth semicircular depression on each side just above the eyes; median carina percurrent, marked with black on metopidium and on the pronotal spine; posterior process long, narrow, tectiform, gradually acute, curving downwards at the tip which does not quite reach apices of tegmina, entirely yellow.

Tegmina long, narrow, hyaline, coriaceous and punctate at base and along basal costal margin, veins prominent and brown, five apical and two discoidal cells.

Under surface of body sordid yellow tinged with fuscous; legs yellow, a brown fascia down the middle of the first and second tibiæ; tarsi fuscous; hind tarsi very much shorter than other two pairs.

Length from front of head to tips of tegmina 12.8 mm.; width between extremities of humeral angles 6 mm.

Type: female. Allotype similar in size, color and markings.

Locality: Bolivia. Definite locality, date and collector unknown. Type, allotype and paratypes all secured several years ago from Staudinger and Bang-Haas and labeled simply "Bolivien."

Near *Umbonia reclinata* Germar, but differing particularly in being entirely without the characteristic red markings.

Large, uniformly bright yellow except tip of pronotal horn and apical margins of humeral angles, which are black; very coarsely punctate; pronotal horn very sharp and much inclined backward; posterior process deflexed at tip and not quite reaching apices of tegmina.

**Hoplophora rubripes** new species.

Head very small, dull yellow, very roughly sculptured, very hairy; base sinuate; eyes large, prominent, centers dark brown, this bordered with a

narrow line of bright red, this margined externally by a yellow band; ocelli large, yellow, shining, conspicuous, about as far from each other as from the eyes and situated about on a line drawn through centers of eyes; margins of genæ curved, somewhat flattened, protruding; clypeus subtriangular, yellow, extremely hairy, some of the hairs yellow and others black, extending for half its length below the inferior margins of genæ, tip blunt, rounded and pilose.

Pronotum concolorous sordid yellow with very large coarse punctures and dense pubescence of mingled yellow and black hairs; metopidium broadly convex, broader than high; humeral angles large, broad, auricular, strongly margined with bright red; median carina indistinctly percurrent; posterior process short, broad, triangular, margined with red, apex suddenly acuminate, tipped with red, reaching just beyond internal angles of tegmina but not reaching end of abdomen.

Tegmina long, narrow, subhyaline, much wrinkled; veins strong, prominent, marked with black and brown; base coriaceous, opaque, pubescent, lightly punctate, with the veins of the costal and central basal area red; tip rounded and extending far beyond end of abdomen.

Under surface entirely yellow and densely pubescent; first and second tibiæ with bright red median bands; first and second tarsi dark brown; hind legs entirely light yellow.

Length from front of head to tips of tegmina 13 mm.; width between extremities of humeral angles 6.4 mm.

Type: female.

Locality: Esperito Santo, Brazil. Date and collector unknown.

Near *Hoplophora pubescens* Buckton and apparently closely related to *H. pertusa* Germar, but larger than either of these species, differently marked and with a differently striped pronotum.

Large, broad, very hairy, dull yellow, coarsely punctate; first and second tibiæ brilliantly marked with red; humeral angles and basal veins of tegmina red; posterior process not reaching end of abdomen; tegmina extending well beyond end of abdomen; under surface entirely yellow.

**Ochropepla carinata** new species. (Pl. I, fig. 10.)

Head subquadrate, yellow, finely punctate, densely pubescent, deflexed; basal margin nearly straight; eyes large, prominent, brown; ocelli large, yellow, nearly twice as far from each other as from the eyes and situated just above a line drawn through centers of eyes; margins of genæ sinuate; clypeus as wide as long, extending for nearly half its length below inferior margins of genæ, projecting slightly beyond genæ on either side, tip broadly rounded and pubescent.

Pronotum elongate, testaceous, finely punctate, sparingly pubescent; dorsal line regularly arcuate on anterior half, slightly depressed at base of posterior process; a strong, curved, dark brown ridge extending above the humeral angles on each side of the median ridge but not quite reaching the median ridge in front or the lateral margin of the pronotum behind; below these lateral ridges are two or three fainter carinae on each side; metopidium broadly convex, marked with an irregular dark brown spot on each side just above the lateral margins of the head; median carina strongly percurrent and edged with brown; humeral angles not prominent, obtuse and blunt; posterior process short, tectiform, gradually acute, extending slightly beyond internal angles of tegmina but not reaching end of abdomen.

Tegmina subopaque, wrinkled; base coriaceous and punctate; two broad dark brown fasciae extending obliquely across center with areas between them testaceous; tip pointed and wrinkled; five apical and three discoidal cells; hind wings with four apical cells.

Under surface of body dark brown in front, shading to testaceous behind; legs uniformly luteous; hind tarsi very much shorter than other two pairs.

Length from front of head to tips of tegmina 5.7 mm.; width between extremities of humeral angles 3 mm.

Type: female.

Locality: Para, Brazil. July 7, 1919 (Parish).

Small, testaceous, a prominent brown carina on each side of median carina and indistinct ridges below these; body elongate; posterior process reaching just beyond internal angles of tegmina, but not to end of abdomen; tegmina mottled testaceous and brown; under surface of body brown; legs luteous.

#### Subfamily Darninae.

##### *Stictopelta squarus* Fairmaire.

1846. *Darnis squarus* FAIRM. Rev. Memb., 482, 15.

1851. *Darnis squarus* WALKER. List Hom. Brit. Mus., 578, 17.

1851. *Darnis robusta* WALKER. List. Hom. Brit. Mus., 579, 25.

1858. *Darnis squarus* WALKER. List. Hom. Brit. Mus., Suppl., 147.

1878. *Stictopelta squarus* BUTLER. Cist. Ent., 341, 10.

One female from Flores, Manaos, Brazil, Nov. 7, 1919 (Parish). A rare species remarkable for its size, being one of the largest membracids known.

##### *Combophora maculata* Guérin.

1838. *Combophora maculata* GUER. Icon. du Reg. Anim.

1846. *Combophora maculata* FAIRM. Rev. Memb., 505, 4.

1846. *Combophora consentanea* FAIRM. Rev. Memb., 505, 3.  
 1851. *Combophora consentanea* WALK. List Hom. Brit. Mus., 599, 3.  
 1851. *Combophora maculata* WALK. List Hom. Brit. Mus., 599, 4.  
 1878. *Combophora maculata* BUTLER. Cist. Ent., II: 354.  
 1878. *Combophora consentanea* BUTLER. Cist. Ent., II: 354.  
 1903. *Combophora consentanea* BUCKT. Mon. Memb., 146, Pl. 31, fig. 6.  
 and Pl. 32, fig. 4.  
 1903. *Combophora maculata* BUCKT. Mon. Memb., 146.

A fine series of this remarkable insect, of which I believe the above synonymy to be correct, from Iquitos, Peru, March-May, 1920, and Yurimagous, Peru, March 31, 1920. Many specimens without the pronotum and many pronotums without bodies are represented, illustrating the habits of these insects of separating themselves from their grotesque armor as described by Professor Mann for a closely related species, *Combophora beski* Germar. (Mann, Wm. M., A Protective Adaptation in a Brazilian Membracid. Psyche, XIX: 5, pp. 145-147. Pl. 12. October, 1912.)

***Combophora obfuscata* Buckton.**

1903. *Combophora obfuscata* BUCKT. Mon. Memb., 147, Pl. 31, figs. 7.  
 7a; Pl. 32, fig. 6.

One female from Napo River, Peru, June, 1920 (Parish).

***Nassunia nigrofascia* new species. (Pl. I, figs. 11 and 12.)**

Head as long as broad, yellowish, deeply and irregularly punctured with black, roughly sculptured, margins produced; basal margin arcuate, on margin just above each ocellus a large round black spot rimmed with yellow; eyes very large, conspicuous, brown; ocelli large, brown, conspicuous, about as far from each other as from the eyes and situated on a line drawn through centers of eyes; margins of genæ sinuate; clypeus longer than wide, produced below inferior margins of genæ and continuing the line of the genal margins, longitudinal black line on each side of middle, tip rounded, slightly produced, pilose.

Pronotum greenish-white, deeply punctured with black, very sparingly pubescent; median carina strongly percurrent; metopidium slightly convex, about as broad as high, a semicircular impression above each eye, margin next to head much more finely punctate than area above; humeral angles small, inconspicuous, blunt; suprahumeral horns long, slender, black, very sharp, extending almost directly outward, very slightly upward and backward; dorsum gradually rounded, highest just behind suprahumeral, anterior third greenish, central third black, posterior third ferruginous; posterior process long, slender,

gradually acuminate, much deflexed, tip reaching well beyond end of abdomen but not reaching tips of tegmina, apical end ferruginous.

Tegmina hyaline, entirely exposed; base very slightly coriaceous and punctate, a narrow black opaque spot at base just at margin of pronotum; veins very prominent, black in central area; five apical and one discoidal cell; third apical cell strongly petiolate. Hind wings with four apical areas.

Under surface of body uniformly greenish-yellow; legs and feet entirely luteous; hind tibiae minutely spined with black.

Length from front of head to tips of tegmina 7.8 mm.; width between tips of suprahumeral horns 5 mm.

Type: female.

Locality: Iquitos, Peru, April 21, 1920 (Parish). Paratypes from same locality and from Yurimaguas, Peru.

Near *Nassunia binotata* Fairmaire but larger, differently colored and with the posterior process much more deflexed.

Large, robust, greenish white, with a broad black band on each side extending from above the eye to the suprahumeral horns, then backward and upward to the base of the posterior process; central part of median carina black; apex of posterior process brown; suprahumeral long, slender, sharp, extending almost directly outward; posterior process deflexed, not reaching tips of tegmina. Superficially much suggesting the genus *Ceresa*.

### **Cymbomorpha amazona** Stål.

1866. *Cymbomorpha amazona* STÅL. Analect. Hem., 388.

Four specimens, one from Iquitos, Peru, March 16, 1920, another from the same locality collected April 16, 1920, one from Napo River, Peru, June, 1920, and one from Parintius, Brazil, October 3, 1919. All taken by Mr. Parish.

### **Cymbomorpha nitidipennis** new species. (Pl. II, fig. 1.)

Head subtriangular, roughly sculptured, luteous sprinkled with ferruginous, coarsely punctate, sparingly pubescent; base sinuate; apex very acute; eyes large, prominent, brown; ocelli small, ferruginous, inconspicuous, farther from each other than from the eyes and situated about on a line drawn through centers of eyes; margins of genæ strongly sinuate; clypeus longer than wide, lateral margins continuing line of margins of genæ, apex very acute and slightly pilose.

Pronotum compressed, arcuate, highest in middle, coarsely punctate, not pubescent, mottled ferruginous and luteous with the former color predominat-



ing on the posterior half; humeral angles short, blunt, rounded, projecting laterad about as far as the eyes; metopidium compressed laterally, about as high as wide; median carina strongly percurrent, very thin and sharp in middle of dorsum; posterior process short, gradually acute, tectiform, reaching to internal angles of tegmina and just about to tip of abdomen.

Tegmina very shining, glassy, polished; veins heavy, mottled ferruginous and luteous; base narrowly coriaceous and punctate; five apical and two discoidal cells; apical cells long and slightly curved.

Under surface of body concolorous luteous; legs luteous, claws flavous.

Length from front of head to tips of tegmina 6.2 mm.; width between humeral angles 2.4 mm.

Type: female.

Locality: Iquitos, Peru. March 16, 1920 (Parish). Paratypes from Para, Brazil, July 7 and July 30, 1919 (Parish).

Small; ferruginous mottled with luteous; a small luteous spot on median line at base of posterior process and another just before apex; posterior process just reaching internal angles of tegmina; tegmina very polished and shining with bases opaque; under surface of body and entire legs luteous; claws flavous.

*Scaphula maculata* new species. (Pl. II, fig. 2.)

Head subtriangular, sculptured, black, polished, shining, finely and sparingly punctate, not pubescent, margins slightly produced, median line between the ocelli yellow; base nearly straight; eyes very large, light brown, twice as wide as high as seen from a front view; ocelli large, conspicuous, brown, equidistant from each other and from the eyes and situated slightly above a line passing through centers of eyes; margins of genæ nearly straight; clypeus about as wide as long, margins nearly continuing outline of margins of genæ, depressed in center, apex broadly rounded and strongly pilose.

Pronotum shield-shaped, regularly arcuate, not at all compressed laterally, only slightly elevated, about twice as long as broad, very finely punctate, not at all pubescent, polished and shining; entire pronotum shining black except a very large bright yellow spot on each humeral angle which extends forward to the head, and a pale-green spot on the apex of the posterior process; humeral angles broadly rounded, not conspicuous, extending laterad a little farther than the eyes; metopidium slightly convex, broader than high; median carina faintly percurrent; posterior process very broad, rounded, blunt, the apex pale green and extending just beyond the internal angles of the tegmina.

Tegmina almost entirely exposed; basal two thirds shining black and subopaque except narrow proximal area of yellow; apical third hyaline; veins strong and very distinct even in black portion; five apical and two discoidal cells; veins of apical area more or less curved.

Under surface of body black; legs pale green.

Length from front of head to tips of tegmina 6 mm.; width between humeral angles 3.7 mm.

Type: male.

Locality: Teffe, Brazil. Oct. 12, 1919 (Parish).

Black, shining, humeral angles broadly bright yellow, apex of posterior process pale green; tegmina with basal two-thirds black and shining, apical third hyaline; under surface of body black; legs pale green; general aspect of a large *Tragopa*.

#### Subfamily **Tragopinæ**.

***Tragopa scutellaris*** Buckton.

1903. *Tragopa scutellaris* BUCKT. Mon. Memb., 156, Pl. 33, Figs. 1 and 1a.

Two specimens, a male and a female, from Prata, Brazil, July 5, 1919 (Parish).

***Tragopa albifascia*** new species. (Pl. II, fig. 3.)

Head wider than long, deflexed, very convex, smooth, polished, shining brown, not punctate nor pubescent; basal margin strongly sinuate; eyes large, dark brown margined with yellow; ocelli large, conspicuous, yellow, twice as far from each other as from the eyes and situated slightly above a line drawn through centers of eyes; margins of genæ sinuate; clypeus subquadangular, longer than wide, extending for half its length beyond inferior margins of genæ, not quite continuing line of genal margins, tip rounded; antennæ very long and bright yellow.

Pronotum gradually rounded, not twice as long as wide, shining chocolate brown, somewhat lighter on posterior third, metopidium and humeral angles highly polished, very sparingly and faintly punctate, not pubescent; an irregular white or yellowish line on each side, starting at the lateral margin of the pronotum a little posterior to the middle of the body and extending upward for about one third of the distance to the median line; humeral angles small, prominent, triangular, blunt; median carina absent except as a very faint line at the apex of the posterior process; posterior process short, heavy, convex above, somewhat angular at apex, blunt.

Tegmina almost entirely concealed by the pronotum; less than one third exposed; exposed portion entirely coriaceous, opaque and dark brown; veins indistinguishable.

Under surface of body dark brown; legs lighter brown.

Length 3.3 mm.; width between humeral angles 2.5 mm.

Type: female. Male somewhat smaller and darker.

Locality: Bolivia. Exact locality, date of collecting and collector unknown.

Described from two females and one male.



Small, shining brown except for a thin white line on each side about half way back from the humeral angles extending upward from the lateral margin of the pronotum one third of the distance to the median line; exposed portion of tegmina coriaceous and dark brown; under surface of body brown; legs light brown.

**Tragopa pubescens** new species. (Pl. II, fig. 4.)

Head about as long as wide, only slightly convex, deflexed, sculptured, very finely punctate, sparingly pubescent, concolorous greenish-yellow; basal margin sinuate; eyes small, not prominent, brown; ocelli large, glassy, about twice as far from each other as from the eyes and situated on a line drawn through centers of eyes; inferior margins of genæ strongly sinuate; clypeus longer than wide, extending for half its length below margins of genæ, strongly pilose. No part of the head except the eyes is visible from a strictly dorsal view.

Pronotum broadly convex, highest at base of posterior process, dark brown except the humeral angles which are lighter and a light transverse band extending across the middle, strongly pubescent with rather long stiff hairs; humeral angles broad, rounded; metopidium sloping, broader than high; median carina obsolete; lateral margins more or less sinuate, hollowed out behind humeral angles exposing the bases of the tegmina from a dorsal view; posterior process broad, convex, margins deflexed over tegmina, apex blunt.

Tegmina nearly half exposed, entirely opaque and coriaceous; veins indistinct; basal two thirds light brown; apical third black; tips extending very slightly beyond apex of posterior process.

Under surface of body brown, strongly pubescent; legs and feet brown.

Length 3.7 mm.; width between humeral angles 2.7 mm.

Type: female.

Locality: Iquitos, Peru. April 16, 1920 (Parish).

Small, dull, not shining, dark brown, except head, which is greenish yellow, and humeral angles, which are light brown, and with a faint transverse band of lighter brown entirely across center of pronotum; distinctly and strongly pubescent; tegmina nearly half exposed, light brown, except apices, which are black; legs and under surface concolorous light brown.

**Tragopa longa** new species. (Pl. II, fig. 5.)

Head wider than long, slightly convex, smoothly sculptured, brown mottled with luteous, shining, not punctate, not pubescent; basal margin sinuate and produced in a strong ridge; eyes small, brown margined with luteous; ocelli large, yellow, shining, conspicuous, twice as far from each other as from the eyes and situated about on a line drawn through centers of eyes;

margins of genæ sinuate; clypeus longer than wide, extending below inferior margins of genæ.

Pronotum broadly convex, sloping in front, highest over the base of the posterior process at about the posterior third of the body length, very dark brown, highly polished, shining, very faintly and finely punctured, not pubescent; metopidium twice as broad as high, sloping; median carina obsolete; humeral angles broad, blunt, not prominent; posterior process broad, blunt, tip rounded; lateral margins almost straight but slightly hollowed out behind the humeral angles. Marginal ridge of base of head, eyes and bases of tegmina visible from a strictly dorsal view.

Tegmina about one third exposed; basal three fourths dark brown, shining; apical fourth black; veins indistinct; tips entirely concealed.

Under surface of body brown; legs and feet ferruginous; hind tibiae somewhat darker.

Length 5 mm.; width between humeral angles 3 mm.

Type: female.

Locality: Callanga, Peru.

Long, narrow, slender-bodied, very dark brown without markings, very highly polished and shining; head produced forward at base; pronotum highest at posterior third; tegmina about one third exposed, brown, shining; under surface of body brown; legs and feet ferruginous.

**Tragopa brunneimaculata** new species. (Pl. II, fig. 6.)

Head as long as broad, shining yellow, very faintly punctate, not at all pubescent; basal margin slightly rounded; eyes small, brown bordered with sordid yellow, not prominent; ocelli very small, inconspicuous, yellow, twice as far from each other as from the eyes and situated somewhat above a line drawn through centers of eyes; clypeus extending below inferior margins of genæ, tip rounded.

Pronotum arcuate, highest in middle, very finely punctate, not pubescent, shining yellow except for a large brown triangular patch on each side behind the shoulders, the base of the triangle touching the lateral margin of the pronotum and the apex not quite reaching the median line, and a brown band extending entirely across the pronotum just behind these brown areas; metopidium sloping, broader than high, a small smooth brown semicircular area above each eye; median carina faintly percurrent; humeral angles blunt, rounded; lateral margins slightly hollowed out behind humeral angles to expose bases of tegmina from a dorsal view; head not at all and eyes only slightly visible from a strictly dorsal view; posterior process heavy, angular, tip truncate, depressed downward to cover tips of tegmina.

Tegmina yellow, opaque, about one third exposed; veins indistinct; tips entirely concealed.

Under surface of body yellow; apex of abdomen darker. Legs yellow mottled with brown.

Length 4 mm.; width between humeral angles 3 mm.

Type: male.

Locality: Bolivia.

Small, shining yellow, with a large triangular brown spot on each side behind the humeral angles and a brown transverse band extending entirely across the pronotum behind these spots; head yellow; tegmina about one third exposed; under surface of body and legs yellow marked with brown.

**Tragopa maculidorsa** new species. (Pl. II, fig. 7.)

Head wider than long, deflexed, shining yellow brown, not punctate, not pubescent; basal margin sinuate; eyes small, brown with yellow margins, not prominent; ocelli small, yellow, conspicuous, farther from each other than from the eyes and situated about on a line drawn through centers of eyes; thin vertical yellow line from base to clypeus; lateral margins of genæ rounded; clypeus almost continuing outline of genæ.

Pronotum elongate, polished, very faintly punctate, very sparingly pubescent; anterior two thirds chocolate brown, posterior third grayish-brown; an irregular semicircular white line beginning on each humeral angle and extending backward in an arc to the lateral margin of the pronotum, an irregular, broad, nearly straight white band on each side beginning at the lateral margin of the pronotum at the base of the posterior process and extending directly upward about half way to the median dorsal line, a number (12 in the type specimen) of irregularly shaped and irregularly arranged white spots on the middle portion of the dorsum; posterior grayish area rectangular, one angle resting on the median dorsal line; pronotum broadest across humeral angles; no part of the head except the eyes visible from a strictly dorsal view; dorsum regularly convex; median carina obsolete, indicated only by a faint line on the posterior third; humeral angles prominent, blunt, rounded; metopidium sloping, nearly twice as wide as high, brown except at margins of humeral angles which are yellowish above the eyes; posterior process short, heavy, angular, acute, just reaching the tips of the tegmina.

Tegmina about one third exposed, brown, opaque, veins indistinct, tips entirely concealed.

Legs and under surface of body yellow; proximal and distal ends of tibiæ ferruginous; tarsi fuscous.

Length 3.7 mm.; width between humeral angles 2.3 mm.

Type: male.

Locality: Bolivia.

Small, narrow, shining brown, with a white arcuate line behind

each humeral angle, a white straight line on each side at base of posterior process, and a number of irregular white dots on central part of dorsal surface; broadest across humeral angles; posterior process pointed; legs and under surface of body yellow.

**Horiola lineolata** Fairmaire.

1846. *Horiola lineolata* FAIRM. Rev. Memb., 492, 2.

1851. *Horiola lineolata* WALK. List Hom. Brit. Mus., 586, 2.

1903. *Horiola lineolata* BUCKT. Mon. Memb., 158.

One female from Parintius, Brazil, collected by Mr. Parish on Sept. 25, 1919.

I am not at all convinced that this is a synonym of *Horiola arcuata* Fabr., as suggested by Fowler (B. C. A., p. 86). *H. lineolata* appears to be a longer, more slender-bodied insect with distinct specific characters. The markings, to be sure, are quite similar in the two species, but even in general facies the insects are easily distinguished. A long series of both species fails to show intermediate forms.

**Horiola fenestrata** new species. (Pl. II, fig. 8.)

Head about as wide as long, uniformly brown, polished, not punctate, not pubescent; basal margin sinuate; eyes large, prominent, brown margined with lighter; ocelli large, brown, inconspicuous, farther from each other than from the eyes and situated above a line drawn through centers of eyes; margins of genæ sinuate; clypeus longer than wide, notched on each side at margins of genæ, tip truncate.

Pronotum regularly convex, rich dark reddish-brown, very shining, finely punctate, very sparingly pubescent; a narrow bright yellow line extending from the tip of each humeral angle upward and backward about half way to median dorsal line; another thin short yellow line at the middle of each side beginning just above the lateral margin and extending upward about three times its width; a third yellow line at about the base of the posterior process extending from the lateral margin almost to the median dorsal line; metopidium smooth, sloping, twice as broad as high; median carina obsolete; humeral angles prominent, triangular, blunt; posterior process suddenly acute, not quite reaching the tips of tegmina.

Tegmina about half exposed, entirely opaque and coriaceous except for a window-like subrectangular area on the costal margin about one third the distance from the apical end, this area entirely hyaline and transparent; veins indistinct; margin narrow.

Under surface of body uniformly reddish-brown; legs ferruginous; tarsi flavous.

Length from front of head to tips of tegmina 5 mm.; width between humeral angles 3 mm.

Type: male.

Locality: Iquitos, Peru. March 16, 1920 (Parish).

Described from the following specimens in addition to the type: one specimen from Yurimaguas, Peru, March 31, 1920; one from Flores, Manaos, Brazil, Nov. 7, 1919; one from Brazil, Aug. 18, 1919; all collected by Parish, and two from Bolivia, collector and date of collecting unknown.

Small, dark brown, shining; elongate, posterior very pointed; a thin yellow line extending upward and backward from each humeral angle, another very short line in middle of lateral margin of pronotum, and a third near base of posterior process extending from margin almost to median dorsal line. Tegmina entirely opaque except for a very distinct subquadrangular entirely hyaline spot at costal margin of apical third which suggests specific name.

***Chelyoidea nitida* Buckton.**

1903. *Chelyoidea nitida* BUCKT. Mon. Memb., 157, Pl. 33, figs. 2, 2a, 2b.

One specimen, a male, from Iquitos, Peru, March 16, 1920 (Parish). This is apparently the first record of this species since its original description.

I have a very strong suspicion that *Tragopa nitida* Germar will have to be placed in the genus *Chelyoidea* in which case Buckton's species, which is the type of the genus, will become a synonym.

***Chelyoidea fasciata* new species. (Pl. II, figs. 9 and 10.)**

Head nearly rectangular, about as broad as long, finely punctate, not pubescent, mottled yellow and brown, smoothly sculptured; base arcuate; eyes large, prominent, sordid white, translucent; ocelli small, glassy, bordered with yellow, conspicuous, twice as far from each other as from the eyes and situated almost on a line drawn through upper margins of eyes; margins of genæ straight; clypeus very broad below margins of genæ, subrectangular, dark brown, notched at margins of genæ, tip truncate and pubescent.

Pronotum shield-shaped suggesting the outline of a turtle's carapace, much longer than wide, coarsely punctate, not pubescent, margins sinuate; ground color orange with a broad black fascia extending transversely across the pronotum and connecting the tips of the humeral angles; an arcuate black fascia on each side beginning at the margin just behind the humeral angle and ending at the margin at the base of the posterior process; metopidium sloping,

much wider than high, with a smooth arcuate impression above the basal margin of the head; humeral angles very large, auricular, triangular, blunt, tips extending slightly upward and forward; below and in front of the humeral angles a broad flap of the pronotum extending caudo-ventrad and partially covering the sides of the pro- and mesothorax and the bases of the front legs; median carina strongly percurrent, brown in front of and black behind the line of the humeral angles; posterior process short, heavy, tectiform, blunt, rounded. No part of the head visible from a strictly dorsal view.

Tegmina about one third exposed for the basal two thirds of their lengths; dark brown; entirely opaque; veins indistinct; tips entirely hidden.

Under surface of body uniform brown; coxæ and femora brown; tibiae of first two pairs of legs yellow, of hind legs yellow on proximal half and brown on distal half; tarsi of first two pairs of legs flavous, of hind legs very dark brown.

Length 4.5 mm.; width between tips of humeral angles 5 mm.; width across middle of pronotum 3 mm.

Type: male.

Locality: Para, Brazil. July 30, 1919 (Parish).

All of the specimens are from the type locality and all are males.

Shield-shaped, orange and black; humeral angles long and slightly curved forward; tegmina about one third exposed, dark brown, entirely opaque; pronotum much produced backwards and downwards behind the eyes in an extension which hides the bases of the front legs; under surface of body brown; legs yellow and black.

***Chelyoidea maculata* new species.** (Pl. II, fig. 11.)

Head nearly quadrangular, mottled yellow and brown, very finely punctate, not pubescent, basal area largely yellow, apical area brown with a diagonal rectangular yellow patch on each side extending from below the ocelli to below the eye and a perpendicular area on the clypeus; dorsal margin sinuate; eyes large, prominent, gray; ocelli large, prominent, elevated, yellow, glassy, twice as far from each other as from the eyes and situated well above a line drawn through centers of eyes; margins of genæ rounded; clypeus triangular, tip broad and truncate, not extending below inferior margins of genæ and continuing the line of the genal margins, very strongly hirsute.

Pronotum ovate, longer than broad, irregularly convex, mottled yellow and brown, finely punctate, not pubescent; head not at all visible from a strictly dorsal view; metopidium sloping, much broader than high; humeral angles very large, prominent, triangular, auricular, anterior half dark brown, posterior half bright yellow, tips acute, extending outward and very slightly upward; lateral margins of pronotum excavated just behind humeral angles to expose bases of tegmina as seen from a dorsal view; median carina prominent, percurrent, brown; posterior process bluntly rounded, tip obtuse, entirely covering apices of tegmina.



Tegmina uniformly dark brown, opaque, coriaceous, veins indistinct, basal and costal margins slightly punctate; apical and internal two thirds entirely hidden under pronotum.

Under surface of body reddish-brown; front legs entirely yellow; other legs yellow except femora and trochanters which are brown.

Length 4 mm.; width between tips of humeral angles 4.4 mm.; width behind humeral angles 3 mm.

Type: male.

Locality: Para, Brazil. July 30, 1919 (Parish).

Small, shield-shaped, brown spotted with yellow, not polished; humeral angles much extended; head mottled yellow and brown; tegmina dark brown, about one fourth exposed at their basal costal margins; under surface of body ferruginous; legs yellow.

**Chelyoidea brunnea** new species. (Pl. II, fig. 12.)

Head twice as wide as long, uniform brown; roughly sculptured, very finely punctate, sparingly pubescent; base sinuate; eyes large, prominent, black; ocelli small, white, glassy, conspicuous, twice as far from each other as from the eyes and situated above an imaginary line drawn through centers of eyes; margins of genæ sinuate; median line slightly red between ocelli; clypeus broad, bent sharply backwards at its base and extending caudad as a broad plate almost at right angles to the frontal plane of the head, as seen from a strictly front view, not extending below inferior margins of genæ.

Pronotum uniform brown, finely punctate, not pubescent; dorsum strongly convex; humeral angles broad, conspicuous, auricular projection of pronotum below and in front of humeral angles very large, concealing bases of front legs; metopidium sloping, broader than high; median carina distinctly and smoothly percurrent but not elevated; posterior process broadly angular, almost truncate; eyes and bases of tegmina visible from a strictly dorsal view.

Tegmina grayish-brown, opaque, coriaceous, punctate; the apical and internal two thirds entirely concealed by the pronotum; veins indistinct; apical margins under the posterior process black.

Under surface of body uniformly brown. Legs uniformly brown, the tibiæ bearing irregular black spines. Tarsi flavous.

Length 5 mm.; width between tips of humeral angles 5 mm.; width across center of pronotum 3.5 mm.

Type: male.

Locality: Napo River, Peru. June 1920 (Parish).

Large, uniformly dark brown without markings, shining, finely punctate, not pubescent; pronotum convex; posterior subtruncate; eyes and bases of tegmina visible from dorsal view; head wider than long; clypeus very much deflexed; legs and under surface of body entirely dark brown.

**Chelyoidea dohrni** Fairmaire.

1846. *Tragoça Dohrni* FAIRM. Rev. Memb., 487, 10.  
1851. *Tragoça Dohrni* WALK. List Hom. Brit. Mus., 582, 11.  
1858. *Tragoça Dohrni* WALK. List. Hom. Brit. Mus. Suppl., 149.  
1894. *Tragoça Dohrni* GÖDING. Cat. Memb. N. A., 393, 1.  
1903. *Tragoça Dohrni* BUCKT. Mon. Memb., 157.

One female from Teffe, Brazil, collected by Mr. Parish on Feb. 1, 1920, is certainly Fairmaire's species and must be referred to the genus *Chelyoidea*.

Subfamily **Smiliinæ**.**Euritea albifasciata** new species. (Pl. II, fig. 13.)

Head about twice as broad as long, roughly sculptured, highly polished, ferruginous, not punctate, not pubescent; basal margin sinuate; eyes large, prominent, flat yellow margined with dark brown and with two brown spots in center; ocelli large, prominent, amber-colored, somewhat elevated, much nearer to each other than to the eyes and situated about on a line drawn through centers of eyes; inferior margins of genæ sinuate; clypeus large, prominent, subcylindrical, luteous, slightly pubescent, projecting for more than half its length below inferior margins of genæ.

Pronotum weakly arcuate, dorsum nearly flat, not compressed laterally, closely punctate, not pubescent, somewhat shining, ferruginous in front, greenish-ferruginous above and on sides, median carina white, posterior process dark brown; three irregular white lines on each side, one extending from above the ocelli upward over the metopidium, another arcuate over the lateral semicircular depression and connecting with the median line at the base of the posterior process, the third submarginal extending backward from the eye over the humeral angle and not quite reaching the second line; metopidium sloping, about as wide as high; humeral angles very small, rounded, not prominent; lateral surface of pronotum slightly depressed on each side in middle, median carina percurrent, white; posterior process long, slender, decurved, acuminate, dark brown, extending just about to apex of abdomen but not reaching tips of tegmina.

Tegmina entirely exposed, shining, hyaline, base narrowly opaque, ferruginous and lightly punctate and marked with a short white fascia; five apical and three discoidal cells.

Under surface of body luteous; legs greenish luteous.

Length 6 mm.; width between humeral angles 2.4 mm.

Type: female.

Locality: Teffe, Brazil. Feb. 1, 1920 (Parish).

Greenish-ferruginous with median carina white; three irregular white stripes on each side and one on base of tegmen; posterior process



dark brown and extending just to apex of abdomen; legs and under surface of body greenish-yellow; tegmina with five apical and three discoidal cells; head twice as broad as long with greatly projecting clypeus and with ocelli very close together.

**Boëthoës hirsuta** new species. (Pl. III, fig. 1.)

Head large, greatly produced forward, not deflexed; roughly sculptured, shining, not punctate, very sparingly pubescent, uniformly brown; basal margin sinuate; eyes very large, sordid white with black centers; ocelli large, prominent, amber-colored, about equidistant from each other and from the eyes and situated about on an imaginary line drawn through centers of eyes; inferior margins of genæ sinuate and decidedly upraised; clypeus longer than wide, hardly extending below margins of genæ, tip pubescent.

Pronotum convex, somewhat swollen behind middle, dorsum nearly straight; rich brown; an irregular greenish-yellow longitudinal patch on anterior half of dorsum extending from just above the head to a point about halfway between line of humeral angles and tip of posterior process, this patch wide in middle and narrow at each end; another greenish-yellow band extending transversely across the pronotum at right angles to the longitudinal patch and confluent with it at posterior end; entire pronotum coarsely and strongly punctate and extremely hairy; humeral angles prominent, rounded, subtriangular; median carina obsolete; metopidium sloping, wider than high; posterior process heavy, blunt, tip rounded, extending beyond tip of abdomen but not reaching apices of tegmina.

Tegmina shining brown, more or less coriaceous, central area narrowly hyaline; base punctate and opaque; veins very irregular, black, prominent, somewhat punctate; clavus and part of corium concealed by pronotum; four apical and three discoidal cells exposed. Hind wings with apical cell stylate.

Under surface of body brown; legs and feet uniformly dark brown and very pubescent.

Length from front of head to tips of tegmina 8 mm.; width between humeral angles 3.7 mm.

Type: female.

Locality: Iquitos, Peru. May 18, 1920 (Parish).

Large, very hairy; brown with a yellow longitudinal band on anterior median area of dorsum and another transverse band across posterior part of pronotum; head greatly produced forward, not deflexed; posterior process rounded, not reaching apices of tegmina; tegmina more or less coriaceous and about half concealed by pronotum.

**Boëthoës nitida** new species. (Pl. III, fig. 2.)

Head long, pointed, extending almost directly forward, not deflexed,

smoothly sculptured, shining, brown, slightly darker along median line, not punctate, not pubescent; basal margin arcuate; eyes very large, prominent, brown margined with greenish; ocelli small, white, glassy, very conspicuous on account of their color, a little farther from each other than from the eyes and situated about on a line drawn through centers of eyes; margins of genæ weakly sinuate, a slight notch at angle of clypeus; clypeus a little longer than wide, depressed at base, rounded at tip, not punctate nor pubescent.

Pronotum convex, arcuate, highest over humeral angles, shining brown, polished, lightly and irregularly punctate, not pubescent, without markings of any kind; metopidium broader than high, sloping, more or less flattened; humeral angles weak, not prominent, subtriangular, blunt; median carina very faintly percurrent; posterior process narrow, rounded, blunt at tip, extending well beyond apex of abdomen but not reaching apices of tegmina.

Tegmina hyaline with coriaceous patches; about two thirds concealed by the lateral margins of the pronotum; veins very heavy, prominent and brown; base opaque, coriaceous and punctate; tip broadly and deeply clouded with brown.

Under surface of head and thorax shining brown; under surface of abdomen lighter grayish-brown; legs and feet concolorous brown and somewhat pubescent.

Length from front of head to tips of tegmina 6.6 mm.; width between humeral angles 2.7 mm.

Type: female.

Locality: Napo River, Peru. June 1920 (Parish).

Elongate, smooth, shining brown, head pointed and projected forward, not deflexed; posterior process narrow; entire insect spindle-shaped as seen from above; tegmina about one third exposed; legs and under surface of body uniformly brown.

**Boëthoës brunnea** new species. (Pl. III, fig. 3.)

Head somewhat projecting forward, about as wide as long, uniformly light brown, polished, weakly sculptured, not pubescent, not punctate; basal margin lightly sinuate; eyes large, prominent, dark brown margined with lighter; ocelli large, prominent, somewhat elevated, yellowish-white, about equidistant from each other and from the eyes and situated about on an imaginary line drawn through centers of eyes; margins of genæ nearly straight; clypeus small, widest near base, tip very pubescent with stiff bristly hairs and not extending below margins of genæ.

Pronotum convex, weakly sculptured, uniformly light brown, closely punctate, densely pubescent; metopidium sloping, wider than high; median carina faintly percurrent; humeral angles small, triangular, acute, not prominent; posterior process gradually acute, extending well beyond apex of abdomen but not reaching apices of tegmina.

Tegmina almost entirely hyaline; about two thirds concealed by the pronotum; veins very prominent, heavy and dark brown; a brown spot at about the middle of the exposed portion, another below base of posterior process and another at apex; areas very irregular; base light brown, opaque, coriaceous and punctate.

Under surface of body uniformly light brown. Legs light brown with upper surfaces of femora, tibiæ and tarsi marked with dark brown; entire leg spined with fine hairs.

Length 4.8 mm.; width between humeral angles 2.3 mm.

Type: female.

Locality: Prato, Brazil. July 5, 1919 (Parish).

Described from three females, two from the type locality and one taken at Para, Brazil, July 7, 1919.

Near the preceding but smaller, head less deflexed, pronotum very pubescent and tegmina more hyaline. Entirely light brown except legs and tegmina which are marked with very dark brown; head only slightly deflexed; posterior process not reaching apices of tegmina; tegmina about one third exposed.

#### ***Amastris consanguina* Stål.**

1858. *Amastris consanguina* STÅL. Hem. Rio Janeiro, II: 30, 3.

Two males, one from Obidos, Brazil, Sept. 10, 1919, and one from Parintius, Brazil, Oct. 3, 1919. Collected by Parish. First record since original description.

#### ***Amastris fallax* Stål.**

1858. *Amastris fallax* STÅL. Hem. Rio Janeiro, II: 30, 1.

One male and one female from Teffe, Brazil, Aug. 12, 1919 (Parish). First record since original description.

#### ***Amastris simillima* Stål.**

1858. *Amastris simillima* STÅL. Hem. Rio Janeiro, II: 30, 2.

One female from Napo River, Peru, June, 1920; one male from Iquitos, Peru, May 11, 1920; one female from Parintius, Brazil, Oct. 3, 1919; one male and two females from Teffe, Brazil, Aug. 12, 1919; two females and three males from Teffe, Brazil, Feb. 1, 1920. All collected by Parish. First record since original description.

#### ***Amastris elevata* new species. (Pl. III, fig. 4.)**

Head as broad as long, subtriangular, green, finely and irregularly retic-

ulate, shining, weakly punctate, not pubescent; basal margin sinuate; eyes large, prominent, brown; ocelli small, amber-colored, conspicuous, equidistant from each other and from the eyes and situated about on a line drawn through centers of eyes; inferior margins of genæ sinuate; clypeus longer than wide, broadest near tip, continuing in outline the line of the margins of the genæ, tip blunt, swollen, densely pubescent.

Pronotum much compressed laterally, highest just behind line of humeral angles, light green irregularly mottled with flavous, finely and closely punctate, not pubescent, more or less polished; metopidium much higher than wide, nearly vertical; median carina black, strongly and sharply percurrent; just below median carina a narrow area of ferruginous; humeral angles prominent, subtriangular, blunt; posterior process tectiform, acute, just reaching tips of tegmina.

Tegmina about one third exposed, yellowish-hyaline, without markings, base and basal costal area narrowly coriaceous and punctate, tips rounded, veins distinct and yellowish.

Under surface of body entirely flavous. Legs and feet flavous and weakly pubescent.

Length 6 mm.; width between humeral angles 3.2 mm.; height of pronotum above humeral angles 3 mm.

Type: female.

Locality: Napo River, Peru. June 1920 (Parish).

Described from one female and one male from type locality, one female from Teffe, Brazil, Feb. 1, 1920, and three females and one male from Iquitos, Peru, May 6-18, 1920. All collected by Parish.

Near *A. obtegens* Fabr., but larger and with the pronotum much more elevated in front. Light green fading to yellowish in cabinet specimens, margin of pronotum narrowly black with irregular ferruginous area below margin. Tegmina yellowish-hyaline, about one third exposed. Posterior process just reaching apices of tegmina. Legs and under surface of body flavous.

The males are slightly smaller than the females. In some of the specimens from Iquitos the black median line is almost obsolete and the insects bear a strong superficial resemblance to *A. obtegens* Fabr. A long series of the latter species, however, collected by Mr. Parish at Flores, Brazil, in 1919 shows very distinct specific differences.

#### ***Amastris projecta* new species.**

Head subtriangular, smooth, polished, green, not sculptured, not punctate, not pubescent; basal margin strongly sinuate; eyes large, prominent, yellow mottled with brown; ocelli small but conspicuous, yellow with brown centers, slightly elevated, equidistant from each other and from the eyes and situated

about on a line drawn through centers of eyes; inferior margins of genæ sinuate; clypeus longer than wide, continuing outline of genæ, tip rounded and pubescent.

Pronotum strongly compressed laterally, highest above humeral angles, anterior margin projecting over the head, posterior margin sloping; uniformly green, finely punctate, sparingly pubescent on metopidium, polished, shining; metopidium higher than wide, dorsal crest leaning forward; median carina strongly percurrent, narrowly black; humeral angles large, prominent, triangular, blunt; posterior process gradually acute, tectiform, just reaching tips of tegmina.

Tegmina nearly one half exposed, yellowish-hyaline, veins prominent, base and basal costal margin narrowly coriaceous and punctate.

Legs and under surface of body uniformly flavous. Tibiæ sparingly pubescent.

Length from front of head to tips of tegmina 6.8 mm.; from anterior point of pronotal crest to apex of posterior process 7.2 mm.; width between humeral angles 3.5 mm.

Type: female.

Locality: Peru. Exact locality, date of collecting and collector unknown.

Described from a pair, the male of which is slightly the smaller.

Near the preceding but larger and with the anterior pronotum projecting over the head. Median dorsal black line very thin and with no ferruginous area beneath it. Posterior margin of pronotum sloping. Uniformly green, polished, closely punctate, sparingly pubescent on metopidium. Legs and under surface of body flavous.

***Amastris sabulosa*** new species. (Pl. III, fig. 5.)

Head subtriangular, very rough, entirely yellow, punctate, sparingly pubescent; basal margin strongly sinuate; eyes large, prominent, bright red; ocelli small but very conspicuous, bright red, elevated, equidistant from each other and from the eyes and situated about on a line drawn through centers of eyes; margins of genæ strongly sinuate; clypeus about as long as broad, widest in center, extending for about half its length below inferior margins of genæ, tip blunt and pubescent.

Pronotum not greatly compressed laterally except at dorsal margin; flavous with irregular markings of ferruginous; roughly sculptured, granular, not shining, densely punctate, sparingly pubescent; dorsal line subarcuate, slightly depressed above line of humeral angles; median carina strongly percurrent; metopidium wider than high, an irregular reddish band extending upward above the eye on each side; humeral angles weak, blunt; posterior process tectiform, blunt, extending well beyond apex of abdomen but not reaching tips of tegmina.

Tegmina hyaline, base and basal costal margin narrowly coriaceous and

punctate, veins prominent and marked with brown, corium about one half exposed.

Under surface of body flavous marked with brown. Legs flavous with distal ends of tibiae dark brown and tarsi black.

Length 3.5 mm.; width between humeral angles 1.8 mm.

Type: female.

Locality: Flores, Manaus, Brazil. Nov. 7, 1919 (Parish).

Described from three females and one male, all from type locality.

Small, rough, pronotal surface granular, flavous, irregularly mottled with reddish; not greatly compressed laterally; eyes red; legs marked with dark brown; tegmina hyaline, except base and costal margins, which are coriaceous and punctate.

***Amastris minuta*** new species. (Pl. III, fig. 6.)

Head subtriangular, slightly longer than wide, weakly sculptured, entirely yellow, finely punctate, very sparingly pubescent; basal margin sinuate; eyes large, prominent, bright red; ocelli small, inconspicuous, luteous, about equidistant from each other and from the eyes and situated about on a line drawn through centers of eyes; margins of genae straight; clypeus longer than wide, widest at tip, continuing the line made by the inferior margins of the genae, tip blunt, rounded and pubescent.

Pronotum entirely and uniformly luteous, shining, coarsely punctate, sparingly pubescent, highest above humeral angles, then weakly arcuate to apex of posterior process; metopidium about as wide as high, arising almost vertically above the head, sides tectiform; median carina strongly and sharply percurrent; humeral angles triangular, blunt; posterior process tectiform, thick, blunt, tip rounded, extending well beyond end of abdomen but not reaching tips of tegmina.

Tegmina luteous-hyaline, about half concealed by pronotum, exposed portion clouded or smoky with yellow, concealed portion entirely hyaline; veins prominent, heavy, yellowish; six apical and two discoidal cells; terminal membrane rather wide and somewhat wrinkled; basal costal margin somewhat coriaceous and densely punctate. Hind wings with four apical and no discoidal areas.

Under surface of head and thorax uniformly luteous; abdomen dull flat yellow, irregularly mottled with brown; legs luteous with hind tibiae bearing minute black spines.

Length 3.3 mm.; width between humeral angles 1.7 mm.

Type: male.

Locality: Yurimaguas, Peru. March 31, 1920 (Parish).

Near the preceding but smaller, entirely and uniformly luteous, eyes red and with pronotum proportionately higher above humeral angles. Metopidium nearly vertical; posterior process blunt and



rounded; pronotum coarsely punctate but only weakly pubescent; tegmina smoky hyaline; under surface of body luteous.

***Amastris maculata*** new species. (Pl. III, fig. 7.)

Head subtriangular, about as long as wide, yellowish-white, coarsely punctate, not polished, not pubescent; basal margin strongly sinuate; eyes large, prominent, yellow mottled with red; ocelli small but conspicuous, somewhat elevated, reddish, about equidistant from each other and from the eyes and situated about on a line drawn through centers of eyes; margins of genæ lightly sinuate; clypeus longer than wide, broadest at lower end, nearly continuing line of inferior margins of genæ, tip blunt, rounded and slightly pubescent.

Pronotum laterally compressed, subarcuate, highest behind line of humeral angles, green mottled with luteous except in front which is brown, finely punctate, not pubescent; metopidium much higher than wide, strongly marked with brown and reddish-brown; median carina strongly percurrent, sharp, irregularly dotted with brown; humeral angles small, triangular, blunt, not prominent; posterior process heavy, tectiform, gradually acute, extending well beyond end of abdomen but not quite reaching apices of tegmina.

Tegmina about one third exposed, shining, hyaline; bases and tips narrowly marked with brown; veins prominent, greenish; base and basal costal area narrowly punctate.

Under surface of head and thorax strongly marked with brown; abdomen green; femora brown; tibiæ mottled brown and ferruginous; tarsi flavous; claws brown.

Length from front of head to tips of tegmina 4.5 mm.; width between humeral angles 2.1 mm.

Type: female.

Locality: Flores, Manaos, Brazil.. Nov. 7, 1919 (Parish).

Small, green, with metopidium, bases and tips of tegmina, under parts of head and thorax and bases of legs strongly marked with brown; anterior margin of pronotum sinuate; dorsum highest behind line of humeral angles; posterior process not quite reaching apices of tegmina.

***Amastris brunneipennis*** new species. (Pl. III, fig. 8.)

Head subtriangular, light green, lightly sculptured, finely punctate, sparingly pubescent; basal margin sinuate; eyes large, prominent, green mottled with light brown; ocelli small, inconspicuous, translucent, equidistant from each other and from the eyes and situated about on a line drawn through centers of eyes; inferior margins of genæ weakly sinuate; clypeus as wide as long, broadest across apical half, continuing outline of margins of genæ, tip rounded and pubescent.



Pronotum uniformly green, strongly pubescent, finely punctate, only slightly elevated, not strongly compressed laterally, dorsal margin arcuate, highest at about the middle of the body; metopidium broader than high, nearly perpendicular above the head, immaculate; humeral angles small, triangular, blunt; median carina strongly percurrent; posterior process short, heavy, tectiform, blunt, extending well beyond end of abdomen but not reaching apices of tegmina.

Tegmina more than half exposed; basal two thirds dark brown and opaque; tips clouded with brown; apical third mostly hyaline; veins very heavy, prominent and brown; base and basal costal area coriaceous and punctate.

Under surface of thorax uniformly dark brown; under surface of abdomen fuscous mottled with brown; trochanters and femora brown; tibiae, tarsi and claws green.

Length from front of head to tips of tegmina 4 mm.; width between humeral angles 2 mm.

Type: male.

Locality: Obidos, Brazil. Sept. 10, 1919 (Parish).

Described from a pair from the type locality collected on the same date and a female taken at Iquitos, Peru, May 18, 1920.

Small, green, pubescent; pronotum not highly elevated nor greatly compressed; tegmina strongly marked with brown; under surface of thorax brown; femora brown, tibiae and tarsi green.

***Adippe nigrorubra*** new species. (Pl. III, fig. 9.)

Head triangular, black with a red spot in the center in the shape of an inverted V, roughly sculptured, coarsely punctate, sparingly pubescent; basal margin weakly sinuate; eyes large, prominent, grayish-brown; ocelli small, conspicuous, amber-colored, somewhat elevated, a little farther from each other than from the eyes and situated about on an imaginary line drawn through centers of eyes; inferior margins of genæ straight; clypeus longer than wide, extending for about half its length below inferior margins of genæ and continuing the straight line made by these margins, tip very acute and sharp.

Pronotum slightly elevated, not compressed laterally, highest a little before the middle, roughly sculptured, indistinctly longitudinally striate near lateral margins, black with a triangular red spot on each side of median line on anterior third behind humeral angles which extends as a reddish line over the humeral angles to the eye and a broad transverse band across the middle extending evenly from one lateral margin to the other; metopidium broader than high, almost perpendicular above the head; median carina strongly percurrent; humeral angles large, auricular, blunt, extending directly outward; posterior process heavy, tectiform, blunt, black, extending just to the apices of the tegmina.

Tegmina about one half exposed, black, coriaceous and punctate except for a triangular hyaline spot on costal margin behind the middle; veins heavy and black; tips rounded.

All segments of all the legs solid black; entire under surface of body black.

Length from front of head to tips of tegmina 7.7 mm.; width between apices of humeral angles 3.2 mm.

Type: female.

Locality: Costa Rica. Date and collector unknown.

Large, rough, black and red, coarsely punctate, not pubescent; posterior process just reaching tips of tegmina; tegmina about half exposed, entirely black and opaque except for a small hyaline spot near middle; under surface of body black; legs entirely black.

This insect was received from Dr. V. Lallemand of Uccle, Belgium, who has sent me a number of very interesting specimens of Membracidæ.

Genus *Lallemandia* new genus.

Scutellum entirely concealed by the pronotum; posterior tarsi longest; tibiae not at all foliaceous; apical cell of tegmina petiolate; tegmina membranous with veins distinct; clavus and part of the corium covered by lateral margins of pronotum; hind wings with apical area stylate; corium with single large vein at base which divides to form oval area just before base; basal area not punctate; suprahumeral horns absent; pronotum not compressed laterally; dorsum bearing large rounded swellings; posterior process short and truncate.

This genus is near the genus *Boëthoës* Kirkaldy (old genus *Paromula* Fairmaire), but differs from it in the shape of the pronotum and the strongly nodulate dorsum. The genus *Lallemandia* is erected for the accommodation of the following species as the type and is dedicated to Doctor V. Lallemand of Belgium, who furnished me with the unique type specimen.

*Lallemandia nodosa* new species. (Pl. III, fig. 10.)

Head subtriangular, brown with a yellow line around each eye, very finely punctate, weakly sculptured, densely tomentose with white wooly hairs; basal margin strongly sinuate; eyes very large, prominent, brown; ocelli large, conspicuous, yellow with black borders, about equidistant from each other and from the eyes and situated somewhat below an imaginary line drawn through centers of eyes; inferior margins of genæ nearly straight; clypeus longer than wide, yellow, very pubescent, extending for more than half its length below inferior margins of genæ and continuing the nearly straight line made by these margins, tip very sharp, hairy.

Pronotum brown, finely punctate, pubescent with white tomentose hairs; not compressed laterally; four large rounded elevations on dorsum arranged in pairs, one node of each pair on each side median line and confluent with node of opposite side, the first pair at about the middle of the body, the second midway between this pair and the end of the posterior process; a broad black band extending forward from anterior elevations down median line to head; a short narrow yellow line on lateral margin just behind anterior elevations; median carina percurrent in front of anterior elevations but obsolete on posterior half of dorsum; metopidium twice as broad as high, darker in the middle; humeral angles large, prominent, triangular, sharp, extending outward and downward; posterior process short, heavy, blunt, truncate, extending somewhat beyond end of abdomen but not nearly to apices of tegmina.

Tegmina long, narrow, pointed, smoky-hyaline, about one half concealed by lateral margins of pronotum; veins heavy and prominent; large brown spot covering almost entire apex behind posterior process.

Sides and under surface of prothorax brown with white tomentose hairs; legs uniformly brown; under surface of abdomen sordid white.

Length from front of head to tips of tegmina 7.2 mm.; from front of head to end of posterior process 5.7 mm.; width between tips of humeral angles 3 mm.

Type: male.

Locality: Roches de Kourou, French Guiana. Date and collector unknown. Unique type kindly sent me by Dr.ALLEMAND.

Large, brown, finely punctate, very hairy; dorsum with four large rounded tubercles; posterior process very short and truncate; tegmina hyaline with prominent veins and with a large brown spot at apex; under surface of body brown; under surface of abdomen sordid white; entire body more or less tomentose.

#### Subfamily **Centrotinæ**.

##### **Stegaspis insignis** Buckton.

1903. *Hyposoprora insignis* BUCKT. Mon. Memb., p. 59, Pl. 8, figs. 6, 6a.

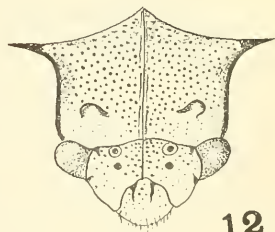
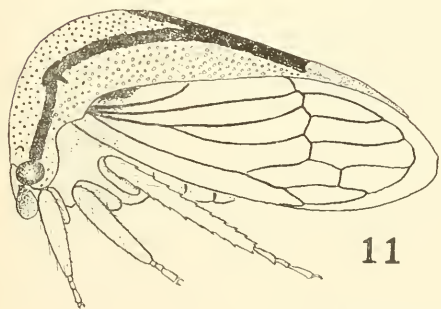
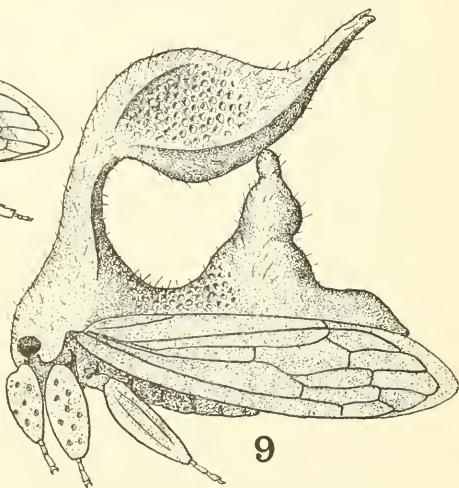
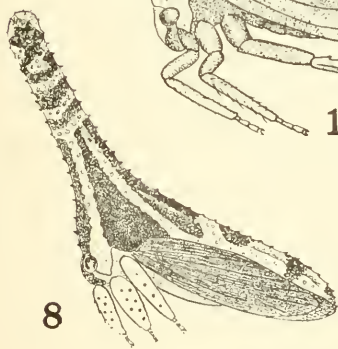
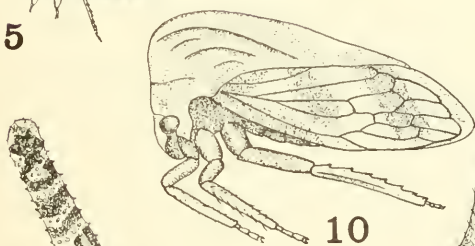
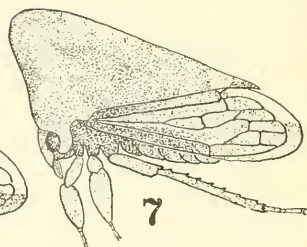
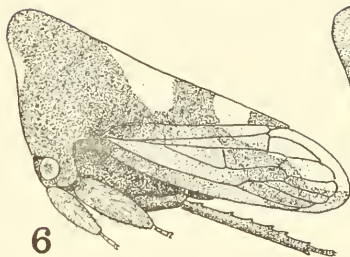
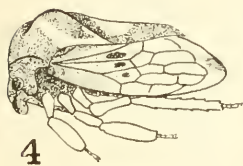
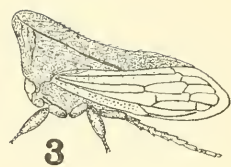
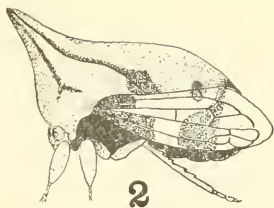
A long series of both sexes from Iquitos, Peru, Parintius, Brazil, and Prata, Brazil, shows that the scutellum is very plainly exposed, thus placing the insect in the genus *Stegaspis* of the subfamily Centrotinæ. A considerable variation in color is found, ranging from pale yellow to dark brown.

### EXPLANATION OF PLATES I, II AND III.

#### PLATE I.

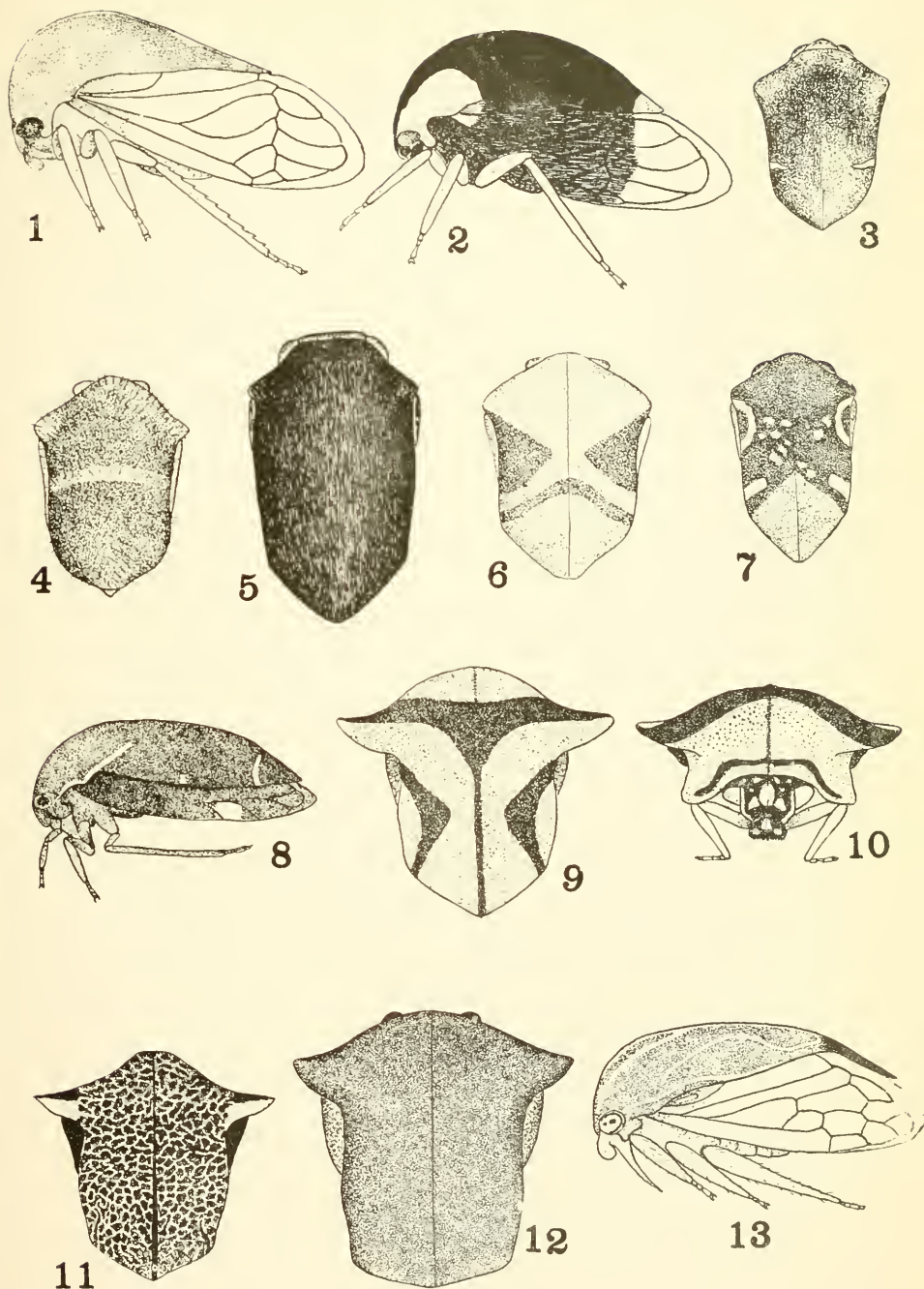
Fig. 1. Lateral view *Enchenopa bifenestrata* new species.

Fig. 2. Lateral view *Enchenopa pulchella* new species.



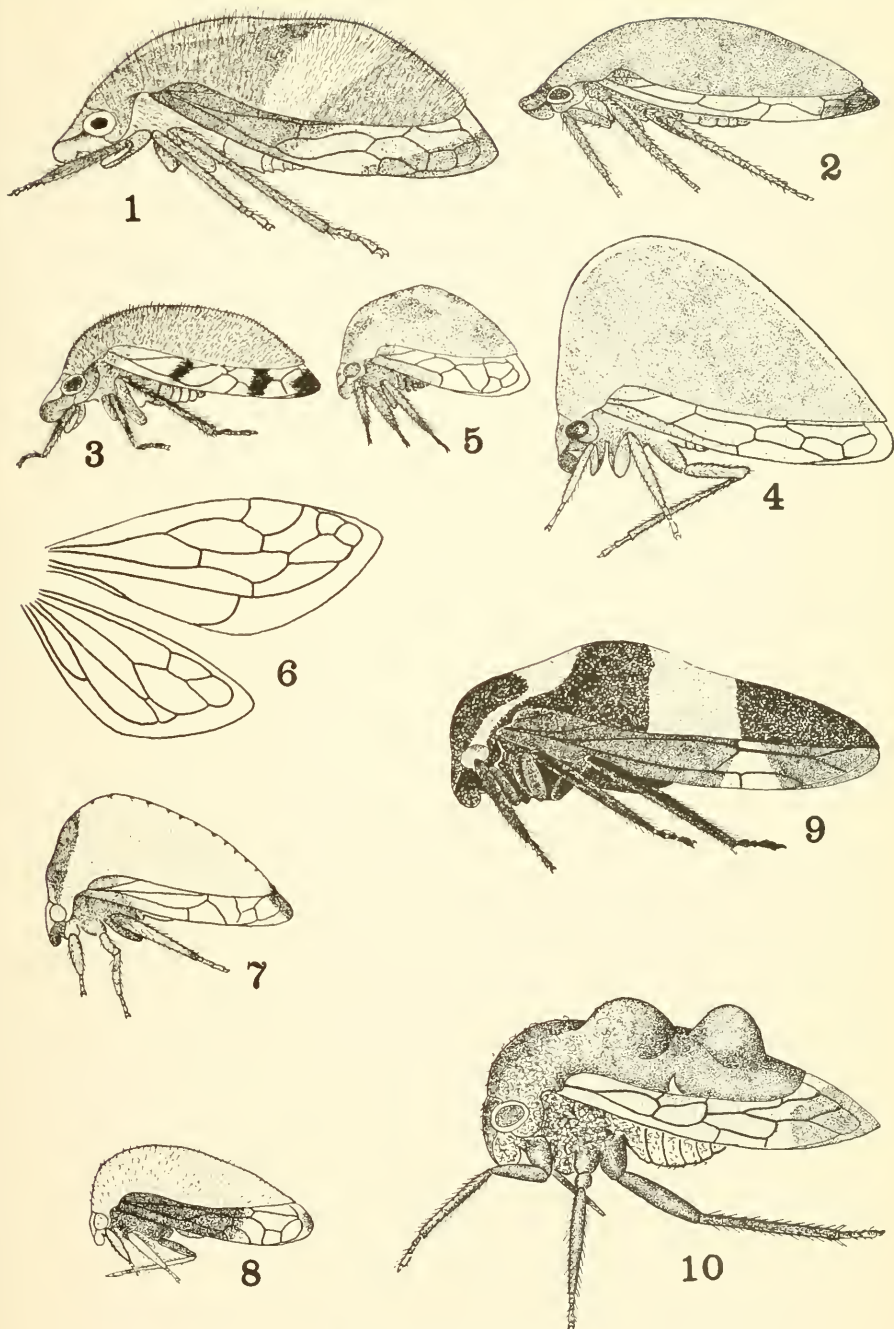












MEMBRACIDÆ.



- Fig. 3. Lateral view *Tropidoscyta immaculata* new species.
- Fig. 4. Lateral view *Tropidoscyta albipes* new species.
- Fig. 5. Lateral view *Tropidoscyta minuta* new species.
- Fig. 6. Lateral view *Leioscyta trimaculata* new species.
- Fig. 7. Lateral view *Leioscyta ferruginea* new species.
- Fig. 8. Lateral view *Hypsoprora albopicta* new species.
- Fig. 9. Lateral view *Spongophorus foliatus* new species.
- Fig. 10. Lateral view *Ochropepla carinata* new species.
- Fig. 11. Lateral view *Nassunia nigrofascia* new species.
- Fig. 12. Front view *Nassunia nigrofascia* new species.

PLATE II.

- Fig. 1. Lateral view *Cymbomorpha nitidipennis* new species.
- Fig. 2. Lateral view *Scaphula maculata* new species.
- Fig. 3. Dorsal view *Tragopa albifascia* new species.
- Fig. 4. Dorsal view *Tragopa pubescens* new species.
- Fig. 5. Dorsal view *Tragopa longa* new species.
- Fig. 6. Dorsal view *Tragopa brunneimaculata* new species.
- Fig. 7. Dorsal view *Tragopa maculidorsa* new species.
- Fig. 8. Lateral view *Horiola fenestrata* new species.
- Fig. 9. Dorsal view *Chelyoidea fasciata* new species.
- Fig. 10. Front view *Chelyoidea fasciata* new species.
- Fig. 11. Dorsal view *Chelyoidea maculata* new species.
- Fig. 12. Dorsal view *Chelyoidea brunnea* new species.
- Fig. 13. Lateral view *Euritea albifasciata* new species.

PLATE III.

- Fig. 1. Lateral view *Boëthoös hirsuta* new species.
- Fig. 2. Lateral view *Boëthoös nitida* new species.
- Fig. 3. Lateral view *Boëthoös brunnea* new species.
- Fig. 4. Lateral view *Amastris elevata* new species.
- Fig. 5. Lateral view *Amastris sabulosa* new species.
- Fig. 6. Front and hind wings *Amastris minuta* new species.
- Fig. 7. Lateral view *Amastris maculata* new species.
- Fig. 8. Lateral view *Amastris brunneipennis* new species.
- Fig. 9. Lateral view *Adippe nigrorubra* new species.
- Fig. 10. Lateral view *Lallemandia nodosa* new species.

## AN ANNOTATED LIST OF THE CICADAS OF VIRGINIA WITH DESCRIPTION OF A NEW SPECIES.

BY WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

The discovery of a new species of cicada in Virginia in 1921 has seemed a sufficient reason for presenting this list, though the records from the state are not very numerous. It is believed, however, that all of the species occurring in the state have probably been included, even though extended records of captures are lacking. A table for the determination of the species is presented, based on the Key to the Cicadas of the Southeastern United States, published in this JOURNAL in 1918.

Through the kindness of Colonel Wirt Robinson, of West Point, the writer has on several occasions had the opportunity of investigating the cicadas and other insects to be found about Wingina, Nelson County, Virginia, one hundred and four miles up the James River from Richmond. Here the colonel spends his summers, not far from where he was born, and here also he has a well-ordered museum containing many mammals, birds and insects, as well as Indian implements, from the vicinity and elsewhere. The woods containing wild turkeys, bunnies, rattlesnakes and their next of kin are close to the house, and one may make observations of interest from the porch of the museum itself. Our first excursion afield in 1921, among these interesting surroundings, was on the afternoon of August 2, when we visited the woods composed mostly of oaks and pines close to the museum building. Directly the writer heard a slow *zapc, zapc, zapc*, repeated about 40 to 45 times a minute, and continued for about one or two minutes. This was altogether a new song and suggested the performance of an Orthopterous insect, but as the colonel said he had heard it on other occasions and supposed it a cicada, our interest in the matter was intensified. If it were a cicada, it was probably a new one, as no other species known to the writer had a song like the one to which we had been listening. We had not long to wait, for soon a cicada about the size of *linnei* was seen on a limb, slowly lifting and lowering its abdomen, and each time it did so it uttered a *zapc*. If very near we

could hear a few ticks in between the zapes, the song somewhat resembling the much shorter performance, the *z-zape*, of *Tibicen pruinosus* var. *winnemanna* of the same locality. It was obvious that this cicada was very much of a tall-tree loving species, and so the next day the colonel loaded a number of shells with small charges of powder and shot, and very skillfully brought down the first representative I had seen of a new species, which it affords me great pleasure to name in his honor. He has known of the insect from his boyhood days, but somehow it has thus far escaped getting a name.

There were six additional species singing about the house and museum, or in the near-by woods. They were: *Tibicen pruinosus* var. *winnemanna*, *T. linnei*, *T. davisi*, *T. lyricen*, *T. sayi* and *T. auletes*. In the mornings *sayi* was the first cicada to sing, and rarely did we hear a *winnemanna*. *Tibicen linnei*, *T. lyricen* and *T. auletes* sang off and on during the day. There was a lull—a time of rest—in the afternoon, after which *winnemanna* commenced to sing its *z-zape* song. About 7 P.M. *auletes* joined in, as did *lyricen*, until all three species produced a continuous cicada chorus in the trees about the house. This would continue until after dark. Only once did we hear a *linnei* near the house; it is found more in the woods among the forest trees where there are moist bottom lands, and *davisi* is a frequenter of the pines. Also about dark the household cats came forth to catch the cicada pupæ that crawled slowly to the trunks of the trees, and ascended if they could escape the aforesaid-mentioned cats and several fat toads that lay in wait for them. We also were among their enemies, and on several occasions collecting a number, placed them on the wire screens in the windows of the museum, where they developed. All we collected were *winnemanna*, except one, which proved to be a female *lyricen*.

Additional notes on each species will be found on the succeeding pages; also acknowledgments are there made to various persons who have aided with specimens. Special thanks, however, are due to Dr. Henry Fox, who, while stationed at Tappahannock in 1915 and 1916, either personally collected or caused to be collected a great many cicadas which he kindly presented to the writer. The specimens mentioned on the following pages are in the writer's collection unless otherwise stated.

## KEY TO THE GENERA OF VIRGINIA CICADAS.

(Okanagana is included as it may occur in the mountains.)

Tympanal coverings concealing tympanal orifices.

Head large and broad; body walls of abdomen thickened; opercula

large ..... **Tibicen** Latreille.

Head small; abdomen translucent; opercula very small.

**Cicada** Linnaeus.

Tympanal coverings absent.

Cells of median area of fore wings (ulnar cells) longer than marginal cells; median and cubitus veins of fore wings not united but reaching basal cell or arculus separately.

Uncus retractile within abdomen of male; opercula rather large, nearly touching on inner margin..... **Tibicina** Kolenati.Uncus not retractile within abdomen of male but exposed; opercula small with extremities far apart..... **Okanagana** Distant.Cells of median area of fore wings (ulnar cells) of about the same length or shorter than marginal cells; median and cubitus veins united near base of fore wing and reaching the basal cell or arculus as a single vein. Very small species..... **Melampsalta** Kolenati.KEY TO THE SPECIES OF THE GENUS **TIBICEN** FOUND IN VIRGINIA.

A. Large, heavy-bodied species; head broad, uncus simple, and first cross vein in the fore wings starting from radius 3 far back, or about one third distant from base of first marginal cell.

B. Uncus longer than broad. Black species with green or greenish markings and black area on the central part of the abdomen beneath, except in *sayi*.

C. Hind margin of pronotum or collar green or greenish.

Dorsum of abdomen with the hind margin of the segments more or less brown and generally but a trace of a pruinose stripe each side on segment three; a narrow irregular area of black on the under side of abdomen; opercula short and broad, obliquely truncated on the inner side. Expands about 95 mm..... **pruinosa** var. **winnemanna** (Davis).

Dorsum of abdomen shining black with a broad pruinose mark each side on segment three; blackened area on under side of abdomen more in the nature of an even stripe. Found near the coast. Expands about 95 mm.

**pruinosa** var. **latifasciata** (Davis).

Dorsum of abdomen shining black without any white stripe each side on segment three; blackened area on under side of abdomen a distinct shining stripe; extremities of opercula

broadly and evenly rounded; obliquely truncated but slightly on the inner side. Expands about 90 mm.

*robinsoniana* new species.

Dorsum of abdomen shining black usually with a small white spot each side at base of segment three; blackened area on the under side of the abdomen a distinct shining stripe; extremities of the opercula obliquely truncated on the inner side. Margin of the front wings suddenly bent near the middle. Expands about 90 mm...*linnei* (Smith & Grossbeck).

A definite longitudinal band of black on the under side of the abdomen; head with the front rather prominent. A rather small species. Expands about 72 mm.

*canicularis* (Harris).

A narrow irregular band of black on the under side of the abdomen; head rounded in front; a rather small species. Expands about 72 mm.....*davisi* (Smith & Grossbeck).

CC. Hind margin of pronotum or collar black or nearly so.

D. Central area of the abdomen beneath black.

Opercula long and with the legs usually somewhat chestnut colored; the uncus when seen in profile forked, resembling the open mouth of a snake. Expands about 95 mm.....*similaris* (Smith & Grossbeck).

Opercula much shorter, more rounded, and the black area on the under side of the abdomen in the nature of an even stripe. Uncus not forked. Expands about 95 mm.

*lyricen* (De Geer).

Blacker than typical *lyricen*, lacking the considerable amount of fulvous markings on the pronotum and mesonotum. A fulvous somewhat anchor-shaped mark centrally on the pronotum. Expands about 95 mm.

*lyricen* var. *engelhardti* (Davis).

DD. Central area of the abdomen not black beneath, often pruinose, as well as the long opercula. Collar black, often with a greenish spot each side near the outer angles. Expands about 95 mm.....*sayi* (Smith & Grossbeck).

BB. Uncus broad at the base, triangular in shape and generally about as broad as long. Opercula broad and rounded at the extremities; no black area on the central part of the abdomen beneath, usually unicolorous. Wings broad; hind margin of the pronotum or collar green or greenish; dorsal segments of the abdomen not margined with brown; in fresh specimens the basal segments pruinose, also the terminal segments, leaving the four middle segments black. A very large species expanding over 110 mm.

*auletes* (Germar).



44. Small species; uncus wish-bone shaped and first cross vein in the fore wings starting from about the middle of the first marginal cell. First and second cross vein of fore wings not clouded, wings clear throughout. Front of head rounded; collar greenish or yellowish, and contrasted in color rather sharply with brown and black of pronotum and mesonotum. Found near the coast. Expands about 70 mm.....*viridifascia* (Walker).

1. *Tibicen pruinosa* var. *winnemanna* (Davis).

Figured in JOURNAL, N. Y. Entomological Society, March, 1915, Pl. 2, fig. 4.

The specimens of *pruinosa* Say examined from Virginia have the dorsum of the abdomen more or less brown in color. Sometimes there is a conspicuous dorsal line of brown spots, one spot on each segment, while in other individuals the hind margin of each segment is edged with brown. They are without the transversely elongated and attenuated pruinose spot on the lateral base of the third segment, which with a black shining dorsum is characteristic of typical *pruinosa* of the general region of the valley of the Mississippi. The Virginia specimens belong to the variety of *pruinosa* described as *winnemanna* in the Bulletin of the Brooklyn Entomological Society for October, 1912, from fifteen individuals collected on Plummer's Island, Maryland.

This insect and *latifasciata* have a very peculiar song, differing considerably from the other native species. It has been described as a rising and falling note, and may be rendered *s-zape*, *s-zape*, *s-zape*. Sometimes the insect will hum along as if it were shut down to half strength, and will then break forth again into its *s-zape* song. It may be heard singing during the day, but it sings more particularly at evening, and an appropriate name for it would be the Evening Cicada. The writer has heard many of them singing along the Potomac River, also in Lynchburg, where on July 29 and 30, 1916, it was quite common in the back yards of the town, but seldom heard in the woods. In August, 1916, it was also heard in Richmond, one at evening in the grounds surrounding the governor's residence, and one in a back yard along East Main Street. Dr. Henry Fox sent me a female collected at Tappahannock, on the Rappahannock River, September 14, 1915. The insect is common at Wingina in Nelson County, also in places across the James River in Buckingham County. The Wingina records are as follows: August, 1913, male; July 11, 1915, male; August 22,

1915, female; August 8, 1916, male; August 16, 1916, male taken from the cicada-killing hornet, *Sphecius*; August 19, 1916, male. The foregoing were collected by Col. Robinson. In late July and the first days of August, 1916, the writer heard several *winnemanna* singing at Wingina, especially near evening, but failed to capture any. From July 11 to 19, 1917, the results were about the same, except that one was heard singing during the progress of a thunder storm. On June 18, 1919, a warm day, one was heard singing at evening close to the house. This was an early date. Later they became more common. From August 2 to 14, 1921, Col. Robinson and I made more of a business of collecting cicadas, not only finding many *winnemanna* pupæ on the trunks of trees at evening, but also securing several with the shotgun. In all we collected thirty-two specimens, twenty-four males and eight females, all from the trees about the house, for we found none and heard none in the regularly forested areas a short distance away.

2. *Tibicen pruinosa* var. *latifasciata* (Davis).

Figured in JOURNAL, N. Y. Entomological Society, March, 1915, Pl. 2, fig. 3.

The only Virginia record for this conspicuously beautiful insect is a male from Revel's Island, October 12, 1915 (W. L. McAtee), collection U. S. Biological Survey. Revel's Island is one of the chain of islands along the Eastern Shore of Virginia, a few islands south of Chincoteague.

The types and numerous paratypes came from Cape May County, New Jersey, and as it is also common in places and at times along the coast of North Carolina, it will no doubt be collected in considerable numbers in Virginia. The shining black tergum with the broad white stripe each side on segment three, readily separates this insect from *winnemanna*. The song of *latifasciata* is a *z-zape, z-zape, z-zape*, continued for a short time.

3. *Tibicen robinsoniana* new species. Pl. IV, figs. 1 and 2.

Type male and allotype female, Wingina, Nelson County, Virginia, August 3, 1921. Davis collection.

Resembles *Tibicen linnei*, and *Tibicen pruinosa* var. *winnemanna* of the same region; it also resembles *pruinosa* of the central United States west of the Allegheny Mountains. From *linnei* it differs in having the costal margin of the fore wings evenly curved instead of being bent at the end of the radial

cell; also in having the opercula more evenly rounded at the extremities instead of truncated obliquely as in that species. From *Tibicen winnemanna* it differs in being smaller, in having the opercula more evenly rounded at the extremities, the outer margins not as converging toward the extremities, and, as in *linnei*, not as obliquely truncated on the inner side. These differences also hold with reference to typical *pruinosa*, which differs further in lacking the shining black median band beneath on the abdomen, so sharply defined in *robinsoniana*.

Head with a broad black stripe between the eyes including the area of the ocelli; supra-antennal plates, and frontal triangular spot between the black transverse rugæ, green; antennæ black. The pronotum is black, with a central, oblong, triangular, green spot, each side of which are large irregular blotches of green or brownish-green; the hind margin of the collar is also green (fore margin partly black), the green extending to the sides, where it is usually interrupted by black close to the base of the fore wings. The mesonotum is marked with green or greenish-brown as in *linnei*, *pruinosa* var. *winnemanna*, and *pruinosa* var. *latifasciata*. The tergum is shining black resembling in this respect *linnei* and *pruinosa* var. *latifasciata*. There is no white stripe at the base of segment three, only a pruinose spot each side at the base of the abdomen, sometimes extended into a transverse pruinose line. There is a pruinose spot each side on the caudal segment, as in *linnei*, *pruinosa* and some other allied species. Beneath pruinose with the transverse rugæ black or brownish-black, and a well-defined, central, shining black stripe extending the length of the abdomen; valve also black, usually margined with pale along the upper edges. Legs greenish variegated with black; opercula pale. The venation of both pairs of wings is as in *linnei*; the first and second transverse veins of the fore wings are clouded; the first two or three marginal cells are slightly smoky and the membranes at the base of both pair of wings are dark gray, those of the hind wings edged with white. The female is colored as in the male, except that the basal pruinose spots of the abdomen may be absent.

#### MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body.....	33	32
Width of head across eyes.....	13.5	13.5
Expanse of fore wings.....	90	90
Length of operculum.....	7	

In addition to the type and allotype the following thirty-four specimens were secured at Wingina, all of them collected with a shotgun: August 3, two males; August 4, ten males; August 7, eight males; August 8, one male; August 9, one male; August 12, six males; Au-

gust 13, one male; August 14, one female; August 15, two males; August 17, one male, and August 20, one male. Nearly all of these specimens were collected in the woods of mixed pines and oaks that occupies the gentle rising slope back of the museum at Wingina, though an occasional individual, as, for instance, the female paratype shot by Col. Robinson's brother, Mr. C. Cabell Robinson, found its way to the locusts and other trees surrounding the house itself. To the south, across the James River, in Buckingham County, we did not hear any *robinsoniana* at either Spear's or Willis's mountains, but we did hear a number in the wooded sections nearer to the river. To the north, in Nelson County, we heard *robinsoniana* in Johnson's Cove near Elmington, in the first line of the Blue Ridge Mountains, and at several places between there and the James River.

Lately Mr. W. S. Hough, of the State Crop Pest Commission, sent the writer a male of this species for examination, collected at Winchester, Frederick County, in the northern part of the state and on the westerly side of the Blue Ridge.

In habits *robinsoniana*, like *linnei*, sings mostly during the sunny hours, but its long-drawn-out slow *zape*, *zape*, *zape* continued for from one to two minutes is a very different performance from the more hurried *seger*, *seger*, *seger* of *linnei* continued for but a short time. The *z-zape* of *pruinosa* var. *winnemanna* is also a very different song and continued but a short time in comparison to *robinsoniana*. *Tibicen pruinosa* var. *latifasciata* sings like *winnemanna*, but it inhabits a belt along the coast, and has the broad pruinose stripes each side on segment three in the male, while the female usually has three stripes near the base of the abdomen, which will further distinguish it from *robinsoniana*. In the introduction to this paper comment has been made on the peculiar song of the species under consideration, and we wish to make it plain that it is very different from that of any of the other native species. All of the large-headed species (those having a simple uncus) have a much more rapid song of short duration. As has also been stated, we had no difficulty in separating by their songs the seven species of cicadas singing about Wingina, and most distinct of all was *robinsoniana*. It is indeed surprising that, on account of this character alone, the species did not long ago attract the attention of entomologists.

4. *Tibicen linnei* (Smith & Grossbeck).

Figured in JOURNAL, N. Y. Entomological Society, September-December, 1918, Pl. 7, fig. 1.

A species of wide distribution and quite common in Virginia. The following specimens have been examined: Mt. Vernon, September 5, 1920, female, in collection of A. N. Caudell; Alexandria County, August 29, 1910, male (Ernest Shoemaker); Spring Hill, Fairfax County, September 21, 1911, female (Davis); Black Pond, Fairfax County, September 7, 1914, male (W. D. Appel); Difficult Run, Fairfax County, August 31, 1916, male (E. A. Preble), U. S. Biological Survey; Falls Church, September 6, male, collection Nathan Banks; Winchester, Frederick County, August, 1921, W. S. Hough collection; Hot Springs, female (Col. Wirt Robinson); Hot Springs, August 14, 1916, male, flew to light at 10.30 P.M. (Morgan Hebard); Charlottesville, September 3, 1915, male (Dr. Henry Fox). Dr. Fox also collected the following series at Tappahannock in 1915: September 11, male; September 14, four males, two females; September 25, male; October 2, two females; October 4, female; October 6, female. In August, 1916, he collected at the same locality nine males and two females. Lynchburg, August 2, 1921, male, taken by the writer from the cicada-killer (*Sphecius*) as it was being brought to its nest. These large hornets had numerous burrows opposite the station of the Chesapeake and Ohio Railroad and close to the tracks. At that date also many male *Sphecius* were stationed near the burrows on various objects and gave chase to the females when they appeared. One of the males had his lookout on a piece of old leather lying on the ground, to which he always returned; one on a piece of brown paper, and still another on a large dead leaf. Others perched on bushes and other near-by plants.

From Wingina, Nelson County, we have, August 7, 1914, male, August 6, 1917, female, August 12, 1919, male, and August 19, 1919, male, all collected by Col. Robinson. In August, 1921, we heard many singing in the woods about Wingina; also at Johnson's Cove, northwest of Elmington, in the first line of the Blue Ridge Mountains on August 8. Across the James River in Buckingham County we heard a number at Spear's Mountain on August 5 and 6, and on the latter date found a dead male and female on a wood road near the James River. On August 9 we heard a number at Willis's Mountain, about



20 miles south of the river. On August 19, after a cold snap, Col. Robinson found ten specimens of *linnei* lying along a shady part of the road overhung by large trees between Spear's and Pluet's mountains. On August 16, 1921, the writer heard many singing at West Hampton, near Richmond.

This is one of the most forest-frequenting of the cicadas, but its presence may be known by its wavy song, which may be rendered *zegez, zeger, zeger*, of rather even tone and continued for a short time.

5. *Tibicen canicularis* (Harris).

Figured in JOURNAL, N. Y. Entomological Society, March, 1916, Pl. 3, fig. 2, and September-December, 1918, Pl. 7, fig. 2.

A dead male, without a head, was found on Bald Knob, Bath County, 3,900 feet, August 19, 1917, and kindly presented to the writer by Mr. Morgan Hebard, who states that it was found "in low scrubby oak forest bordering the bald." The specimen belongs to this species, as the uncus seen in profile is differently shaped than in *davisi*. (See Entomological News, April, 1907, Pl. 3.) This is a common species to the north in Pennsylvania, New Jersey, etc., but how far south it extends can be determined only by future collecting.

This insect has a piercing, high-pitched song, the shrill *zing* lasting but a short time. It is not loud, as the insect is small.

6. *Tibicen davisi* (Smith & Grossbeck).

Figured in JOURNAL, N. Y. Entomological Society, March, 1916, Pl. 3, fig. 3, and September-December, 1918, Pl. 7, fig. 3.

Tappahannock, September, 1915, two males, four females, October 4, 1915, male, and August, 1916, female (Dr. Henry Fox); Newport News, August 10, 1889, male, Otto Heidemann collection and labeled "*Cicada canicularis* Harris var. det. by Uhler"; Lynnhaven, October, 1917, three males, twelve females (A. H. Helme); West Hampton, near Richmond, August 17, 1921, female on trunk of pine and recently emerged. On the trunk of the same tree and elsewhere in the vicinity on pines there were a number of empty pupa skins of this species, but they were not as plentiful as in the same locality in August, 1916. In Nelson and Buckingham counties, what we have considered as *davisi* has been heard on several occasions singing in the pine woods. One was heard singing near Spear's Mountain as early as June 21 in 1919,

and several on Willis's Mountain on August 9, 1921. It is likely that in many places in Virginia this species and *canicularis* are to be found in the same territory as they are in Cape May County, New Jersey. Mr. Andrew N. Caudell has given the writer a female *davisi* collected September 10, 1921, at Point Lookout, Md., just across the Potomac River from the Virginia shore.

7. *Tibicen similaris* (Smith & Grossbeck).

Figured in JOURNAL, N. Y. Entomological Society, September-December, 1918, Pl. 8, fig. 2.

Arlington, male, collection U. S. Nat. Museum. This species is more common to the south of Virginia.

8. *Tibicen lyricen* (De Geer).

\*Figured in JOURNAL, N. Y. Entomological Society, September-December, 1918, Pl. 8, fig. 1.

A species of wide distribution and quite common in Virginia. Inland and especially in the higher parts of the state the variety *engelhardti*, in which the pronotum and mesonotum are nearly all black, except for the anchor-shaped tawny spot on the former, is the prevailing form.

Of typical *lyricen* the following have been examined: Falls Church, August 30, female (Banks); Dunn Loring, July 26, 1915, female, collection University of Michigan; near Bluemont, September 3, 1916, two males (Francis Harper), these approach var. *engelhardti*; West Hampton, near Richmond, August 17, 1921, male found dead on road after cool night; Tappahannock, August 3, 1915, male, approaching var. *engelhardti*; September 10, 1915, male; July, 1916, four males, two females, and August, 1916, two males, one female, all from Dr. Henry Fox. Nelson County, July 31, 1917, female; August 1, 1917, female; August 6, 1917, female; August 4, 1921, male (Col. Robinson). August 5, 1921, we collected a single typical female *lyricen* on Spear's Mountain, Buckingham County, and later a typical female emerged from a pupa found at evening on the trunk of a tree in the garden at Wingina. On June 21, 1919, we heard a *lyricen* singing near Spear's Mountain. This is an early date.



Of variety *engelhardti* the following have been examined: Covington, 1,000 feet, August 17, 1916, female (Morgan Hebard); Hot Springs, 2,500 feet, August 31, 1916, male, taken from cicada-killing wasp (*Sphecius*) by Mr. Hebard; Winchester, Frederick County, July, 1921, male, W. S. Hough collection. The following have been collected in Nelson County by Colonel Wirt Robinson: July 17, 1912, male; July 18, 1912, female; August 9, 1914, female; August 19, 1915, male; August 5, 1916, female; August 10, 1916, male; August 12, 1916, female; July 30, 1917, female; July 31, 1917, female; August 6, 1917, female; August 19, 1919, female; July 25, 1920, female. In addition we dug four *engelhardti* and one typical *lyricen* from the burrows of the cicada-killer on August 6, 1916.

In 1921 the following were collected at Wingina: July 25, female; July 31, male; August 3, male; August 7, female; August 14, male and female; August 16, female; August 21, three females, and August 22, male. At Johnson's Cove, near Elmington, Nelson County, August 8, five females on low trees, principally small persimmons. In Buckingham County on August 5 we found the species very plentiful in a small area on Spear's Mountain, where four males and nine females were collected. Three pair were in copulation and by hitting the small trees on which they were, a smart crack with a club, the locked-together cicadas fell to the ground. On August 11 we heard a number of *lyricen* in that curious pile of rocks known as Willis's Mountain that rises suddenly to the height of 1,159 feet from a generally level country. On several occasions we found dead individuals on the roads. Still later Col. Robinson, on returning to Spear's Mountain, August 19, following some cool nights, found fifty-six cicadas lying on the road running through the gap, nearly all of them in the gap itself where the road was overhung by trees. Most of the cicadas were dead, but a few were living. The majority were *lyricen* var. *engelhardti*, with two or three typical *lyricen* among them, while ten were *Tibicen linnei*; no other species were found.

9. *Tibicen sayi* (Smith & Grossbeck).

Figured in Howard's Insect Book under the name of *tibicen*, Pl. 27, fig. 20.

This is a very common insect in Virginia and 184 specimens have

been examined from the state. It might well receive the name of the Morning Cicada, because the males usually commence singing early in the day before those of the several other associated species. The song is impetuous, the *zing* becoming very rapid, and then gradually subsiding. They are often found in the lowland and will oviposit in golden rods, dead branches of sumach, etc. In such situations they are probably much safer from the cicada-killer, *Sphecius speciosus*, which usually, when after cicadas, searches along the branches of trees and up and down their trunks. In Virginia this large species is sometimes called the "Horse Hornet."

*Tibicen sayi* has been heard singing near Washington as early as June 24, 1911. In the writer's collection there is a male received from Dr. Henry Fox, collected at Tappahannock, Essex County, October 2, 1915, and a male from Lynnhaven, Princess Anne County, October, 1917, from Mr. Arthur H. Helme. Many specimens have been examined from Alexandria and Fairfax counties near Washington; others from Fauquier County, at the foot of the Blue Ridge; Colonial Beach, Westmoreland County; Milford, Caroline County; Ocean View, near the mouth of the James River; Richmond, many in August, 1916, and again in August, 1921; Wingina and other near-by places in Nelson County; in Buckingham County, at Spear's Mountain and along the James River; also Lynchburg, Campbell County.

10. *Tibicen auletes* (Germar).

Figured in JOURNAL, N. Y. Entomological Society, March, 1915, Pl. I, fig. 1; Howard's Insect Book, under name of *marginata*, Pl. 28, fig. 19.

This species and *Tibicen resonans* recorded from North Carolina and southward, but which may yet be found in Virginia, are the largest cicadas found in the eastern United States. *Auletes* ranges farther north than *resonans* and is found in Massachusetts. It is the ventriloquist among our cicadas, and in spite of its large size is often difficult to locate in the tree where it is singing, for the even-toned song, which is not loud considering the size of the insect, seems to come from several directions. While it sings during the sunny hours of the day, it is most active toward evening, and at twilight many individuals may sometimes be seen flying from tree to tree. This

species is more protectively colored than some of the others, and it often blends admirably with the gray bark of certain trees. In the northern part of its range it appears to prefer dry or sandy situations, but it is probably present in most parts of Virginia.

The state records so far secured are as follows: Four Mile Run, Alexandria County, September 1, 1913, male (A. Wetmore), U. S. Biological Survey; Virisco, Fairfax County, August 26, 1914, female (C. R. Shoemaker); Tappahannock, August, 1916, male and three females (Dr. Henry Fox); Dulinsville, Madison County, female, no date, U. S. Nat. Museum; Nelson County, August 3, 1912, male; July 8, 1914, female, and August 9, 1914, male (Col. Wirt Robinson); Richmond, August 24, 1907, female (B. M. Shepherd), U. S. Nat. Museum; August 9, 1916, male, found dead at West Hampton, near Richmond; Warwick County, August, 1911, male (H. H. Bailey), U. S. Nat. Museum; Fortress Monroe, August 10, 1916, male just emerged from pupa skin; Lynnhaven, Princess Anne County, September 30, 1917, female (A. H. Helme).

From August 2 to 14, 1921, we found four males and one female at Wingina, Nelson County, and about the trunks of some of the oaks, both of the white and black oak group, the cast pupa shells were in great abundance. One of the males mentioned above had just emerged from the pupa skin on the morning of August 3, and we found it hanging on a low limb of a tree. Later, after a severe rain and wind storm of the early afternoon, we returned to look for the cicada. As expected, it had climbed high up the tree. The writer climbed after it, and when touched it squirted forth the liquid that recently matured insects possess in abundance. The following day, in the afternoon, we found a second pupa about to split up the back. We carried it home and the insect emerged on the window screen in the museum. The individuals of this species seem much more likely to emerge from the pupæ during the sunny part of the day than those of any other of our native cicadas. Across the James River we heard *auletes* singing near Spear's Mountain on August 5; near Willis's Mountain on August 9 and near the river on August 11 we found *auletes*, *lyricen* and *sayi* lying dead. At West Hampton, near Richmond, on August 16, I heard a few *auletes* singing.

11. *Tibicen viridifascia* (Walker).*Cicada reperta* Uhler.

Figured in JOURNAL, N. Y. Entomological Society, March, 1916, Pl. 6, fig. 1.

The synonymy given above was suggested in this JOURNAL for March, 1916, and December, 1917. Lately it has been confirmed by Mr. W. L. Distant, who compared specimens of *viridifascia* and *resonans* sent from North Carolina in 1920 by Prof. Z. P. Metcalf with Walker's types in the British Museum and found them "identical."

A male of this species was shot with a bean shooter in a small linden tree at Ft. Monroe, Old Point Comfort, August 10, 1916, and a number of others were heard singing in the higher trees as well as in the scrub near the shore. Mr. H. A. Allard has sent me a male from Virginia, collected July 31, 1921, in some small pines on Cape Henry not far from the old lighthouse. At that time they were common, as they often are along the coast to the south of Virginia.

This is the first species mentioned in the present list that has the uncus wish-bone shaped, and as in others having this character, the song is continuous; its *zeekie, zeekie, zeekie* may continue for a long time.

12. *Cicada hieroglyphica* Say.

Figured in JOURNAL, N. Y. Entomological Society, March, 1916, Pl. 6, fig. 5, and Howard's Insect Book, Pl. 28, fig. 11.

Fairfax County, near Washington, June 24, 1920, female (Alan S. Nicolay); Great Falls, Fairfax County, June 27, male, collection Nathan Banks. Also found on the Maryland side of the Great Falls of the Potomac. This species is no doubt common at times in many parts of Virginia. It appears earlier than most of the species belonging to the genus *Tibicen*; is often found among pines, and has a rather shrill song, which is not long continued, and resembles somewhat that of *Tibicen canicularis*.

13. *Tibicina septendecim* (Linnæus).

Figured in Howard's Insect Book, Pl. 27, fig. 16.

According to Bulletin No. 71, U. S. Dept. of Agriculture, Bureau of Entomology, 1907, C. L. Marlatt, nine broods of the 17-year race of the Periodical Cicada and two broods of the 13-year race (one of them doubtfully) are recorded in Virginia. Associated with these is

the variety *cassinii* (Fisher), smaller than the typical form, and with the lower surface of the abdomen usually much darker in color.

#### SEVENTEEN-YEAR RACE.

Brood I (1910-1927); fairly well distributed over the state, except in the central portion.

Brood II (1911-1928); recorded from a broad belt across the central part of the state from north to south. On June 29, 1911, Mr. Wm. D. Appel and the writer observed colonies of this brood at Mt. Vernon, Dyke, Arlington and Cherrydale. They were strictly in colonies as stated. At Dyke we heard but five males singing on the hill that we visited, and we quickly walked out of the area where the insects had been numerous a few days before. The leaves had been burned off of the ground some time in the late spring and showed plainly many of the cones that had been erected by the pupæ at an earlier date, when the dead leaves lay as a mat in the woods.

Brood V (1914-1931); recorded only from Augusta, Caroline, Highland(?) and Shenandoah counties.

Brood VI (1915-1932); recorded from Charlotte, Chesterfield, Fairfax, Powhatan and Prince Edward counties.

Brood IX (1918-1935); from the southern part of West Virginia across Virginia into North Carolina. The following specimens of this brood have been examined: Great Falls, May 23, 1918, female (E. A. Chapin), and male of variety *cassinii* from same locality, May 28, 1918 (W. L. McAtee), both specimens in collection, U. S. Biological Survey.

Brood X (1919-1936); particularly in the northeastern and southwestern portions of the state.

Brood XIII (1922-1939); "a few individuals were reported from two counties in Maryland in 1905, and two very doubtful records (1888) have been found for Kentucky and Virginia."

Brood XIV (1923-1940); reported from Alexandria, Augusta, Buchanan, Dickerson, Fairfax, Frederick, Lee, Nelson, Tazewell and Wise counties.

Brood XVII (1909-1926); reported from Albemarle, Appomattox, Prince William and Washington counties.

#### THIRTEEN-YEAR RACE.

Brood XIX (1920-1933); reported from Brunswick, Halifax, Hanover and Prince George counties.

In the bulletin of 1907 it was stated that Brood XX was of doubtful occurrence in Wise County. In a recent letter Dr. Marlatt reports that after an examination of the old records he concludes that this brood really does not exist in Virginia, but, on the other hand, the occurrence of Brood XIX in the costal plain of the state seems to be well substantiated.

14. *Melampsalta calliope* (Walker).

*Cicada parvula* Say.

Figured in JOURNAL, N. Y. Entomological Society, June, 1920, Pl. 5, figs. 14 and 15; Howard's Insect Book, Pl. 28, fig. 8.

Fairfax County, opposite Plummer's Island in the Potomac, August 9, 1915, female, collected by Mr. H. S. Barber while looking for insects at night. Oak Grove, Loudoun County, July 13, 1920, male, in collection of Mr. Louis A. Stearns, who writes: "The electric train was stopped at the Oak Grove station, when the specimen, which I am forwarding to you, came in the open window and alighted on my coat sleeve."

EXPLANATION OF PLATE IV.

Fig. 1. *Tibicen robinsoniana* Davis. Type.

Fig. 2. *Tibicen robinsoniana* Davis. Enlarged.

Fig. 3. *Tibicen linnei* (Smith & Grossbeck). Cotype.

Fig. 4. *Tibicen pruinosa* (Say). Enlarged.

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A REVIEW OF THE GENUS *PÆCILONOTA* AS  
FOUND IN AMERICA NORTH OF MEXICO (COLE-  
OPTERA, FAMILY BUPRESTIDÆ) WITH DE-  
SCRIPTIONS OF NEW SPECIES.

By W. J. CHAMBERLIN,

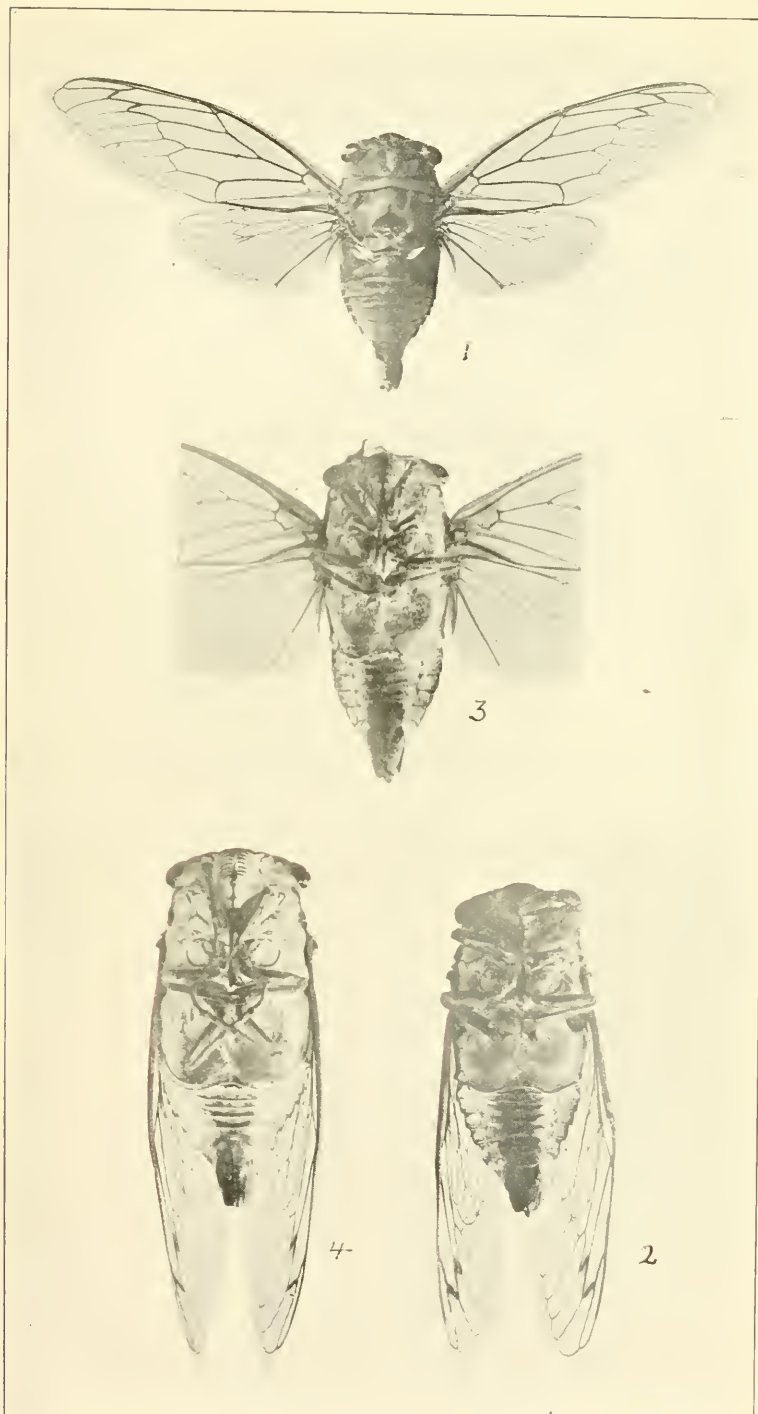
FOREST ENTOMOLOGIST, OREGON AGRICULTURAL COLLEGE.

The genus *Pæcilonota* was erected by Eschscholtz<sup>1</sup> in 1829.

The species are closely related to those of the genus *Dicerca*, but may be separated at once by the broad scutellum.

<sup>1</sup> Friedrich Eschscholtz, Zoologische Atlas I, Berlin, 1829, page 9.





CICADIDÆ.



Up to the present time, despite the fact that only nine species have been described from our territory, there has been much confusion and many specimens have been sent out erroneously named. Of the nine described species four must be placed in synonymy and the status of a fifth (*debilis* Lec.) is doubtful.

A considerable series of species belonging to this genus has been examined from all parts of the United States and Canada, and where it was impossible to examine specimens, as in the case of *debilis* Lec., and *bridwelli* Van Dyke, photographs and drawings were obtained.

The following names have been applied to species occurring in the United States:

1. *P. thureura* Say 1832.
2. *P. cyanipes* Say 1836.
3. *P. costicollis* Gory 1841.
4. *P. erecta* Gory 1841.
5. *P. ferrea* Melsheimer 1844.
6. *P. debilis* Leconte 1859.
7. *P. cupripes* Casey 1909.
8. *P. parviceps* Casey 1909.
9. *P. bridwelli* Van Dyke 1918.

Of the above names, numbers 1, 2, 5 and 9 represent valid species, and from the evidence at hand number 6 would seem to represent a distinct species. In addition to the above, two very distinct species are here described for the first time, and a third species is mentioned which may be but a geographical variety.

Over two hundred specimens have been examined, and with the exception of *P. cyanipes* Say, which shows wide variation, the various species seem to be quite constant and should be easily identified with the aid of the descriptions and figures here presented.

The sexes may be separated by the size and shape of the emargination of the last ventral segment.

The habits of the species, so far as known, are quite similar. The eggs are deposited in the bark of trees and the larvæ mine in the cambium and trunk of the hosts.

The larvæ are of the typical flat-head type, having the first segment distinctly larger and broader than those which follow. The dorsal and

ventral plates of the first segment are roughened and chitinous, the surface is dull. The dorsal plate is marked with an inverted V and the ventral plate is marked with a simple bisecting line.

The larvæ are all wood borers and confine their attack to trees belonging to the genus *Salix* and *Populus*.

Although rarely common, certain members of the genus are widely distributed in the United States, and specimens have been taken as far north as Yukon.

***Pæcilonota thureura* Say.** . Plate V, figures 9 and 10.

This species was first described by Say<sup>1</sup> and placed in the genus *Buprestis*. The original description follows:

"*B. thureura*—Scutel transversely elongated.

"Inhabits Louisiana.

"Body brassy greenish, with dilated unequal impressed punctures: vertex with an acute, longitudinal, impressed line: antennæ green: thorax with the punctures more confluent each side, and a longitudinal, glabrous line: scutel transversely elongated, subbilobate: elytra with punctured striæ: interstitial lines irregularly punctured and with unequal and irregular glabrous spaces: edge not obviously serrate; tip with narrow subemarginate truncation: beneath cupreous, anal segment emarginate. Length less than four fifths of an inch."

"The breadth of the scutel is considerably more than double its length. It resembles *lurida* F. (which is *carrosa* Dej.) but the extraordinary latitude of the scutel distinguishes it; that the species has also bidentate elytra, and a tridentate anal segment."

The following is a more complete description of *P. thureura*, drawn up from a large series. Form oblong oval; dark cupreous brown above, with numerous elongate, quadrate, elevated, smooth, shining spaces of a dark green color, more or less evenly distributed over the elytra; on some specimens these spots have a tendency to coalesce, forming irregular patches; vertex with a smooth elevated line extending downward and branched on the front, forming a Y; an impressed line extends down the center of the stem of the Y; front deeply, rugously punctured; antennæ, first joint cylindrical, cupreous; joints 2 to 10 dark bluish green, joints 4 to 10 flattened; clypeus triangularly

<sup>1</sup> Thomas Say, New Species of North American Insects—Chiefly from Louisiana, New Harmony (Indiana), 1832, page 3.

emarginate; thorax bisected by a broad, elevated smooth space, dark greenish-black in color; closely, coarsely punctured, each side, the punctures becoming larger and more irregular toward the lateral margins; irregular elevated, very dark green, smooth spaces each side. Elytra with prominent, elevated, dark margins, entire for the first half of the distance from the humeri; the last half the distance this ridge is broken by cupreous punctures, giving the edge a slightly serrate appearance; elytra wider than the thorax, sides slightly sinuous, widest just behind the middle and narrowing rapidly to the tips, which are bidentate, but not as conspicuously so as in *ferrea*. Underneath coppery bronze, tinged with green about the edges; coarsely, rugosely punctate; clothed with fine short recumbent, white hairs; each ventral segment with a smooth area along the anterior margin, these areas broader at the middle, tapering toward the lateral margins and ending before reaching the margin; balance of the abdomen coarsely and confluent punctured. (A few of the punctures filled with a white, powdery substance, probably more pronounced in fresh specimens.) Tarsi and legs dark bluish-bronze.

Male (Pl. V, fig. 9) prosternum finely, sparsely punctate; clothed, especially laterally, with long, yellowish hairs. Last ventral segment (Pl. VII, fig. 3) with a wide, deep, crescent-like emargination. The edges of the last ventral segment compressed into a prominent, thin, plate-like border, which is also prominent on the lateral margins of the other ventral segments, present but less pronounced in the female and is lacking in *P. ferrea*.

Length, 12-14 mm.; width, 4.80-5.75 mm.

Female (Pl. V, fig. 10) prosternum less pubescent; last ventral (Pl. VII, fig. 4) with a slight, broad emargination.

Length, 14.50-18.50 mm.; width, 5.75-7.80 mm.

Specimens have been examined from New Orleans, Louisiana; Wallace and Coldwater, Kansas; Elkheart, Indiana; Ames, Iowa; Cicero,<sup>1</sup> Illinois; Pinmit Run, Virginia, and Awame, Manitoba.

The specimens examined show little variation except in size. In one or two specimens the elytral apices are slightly more prolonged and a little narrower than in typical specimens.

Kansas seems to be the optimum region for the species. Mr. Warren Knaus writes: "Many years ago I took *P. thurcure* in considerable

<sup>1</sup> Not typical.

numbers on willows at Wallace, Kansas, on the Smoky Hill River in western Kansas during July. One specimen was beaten from willow in Comanche County, southwestern Kansas."

The dates on specimens examined were: Kansas, July 1, 2, 3; Iowa, July 28; Illinois, August 3 (specimen not typical); Awame, Manitoba, July 7; Virginia, June 27. The other specimens bore no date of capture.

The general distribution seems to be from Manitoba and Lake Michigan, south to the Gulf of Mexico and westward to the extreme western boundary of Kansas.

*Pæcilonota cyanipes* Say. Plate VI, figs. 13 and 14 and Plate VII, figs. 6 and 8.

The original description as set down by Say<sup>1</sup> is:

"*B. cyanipes*—Elytra at tip narrowed, entire and divaricated; scutel transverse."

"Inhabits Missouri."

"Body dark cupreous, tinged with greenish; head, before the antennæ, green; antennæ dark green; thorax confluent punctured; scutel large, angulated each side behind, and excavated in the middle; elytra with darker abbreviated, elevated irregular lines; tips very slightly recurved, divaricated, entire or obsoletely truncate; beneath bright cupreous, not canaliculate, tail deeply emarginate; tarsi blue."

"Length two fifths of an inch." (10 mm.)

"Missouri . . . resembles the *divaricata* in the manner of terminating of the elytra."

The examination of a considerable number of specimens has revealed the fact that this species varies considerably; the elytra are narrowed, prolonged and divaricated; the extreme tips are truncate or very slightly concentric, tending to be bisinuate; scutellum transverse and extremely variable in form. Color varies from cupreous to coppery-green to dull black and dark purple. The front may be green or coppery without regard to the sex. Antennæ green, first joint often coppery. Thorax coarsely, confluent punctured, more so laterally, with an elevated, smooth median line; elytra sparsely punctate, prominently striate, tips usually coppery; under parts cupreous, sometimes bright, sometimes dull. Fresh specimens often covered with a cotton-like sub-

<sup>1</sup> Say, Thomas, Jour. Acad. Nat. Sci. Phila., 1823, Vol. III, p. 164.



stance; tibia coppery or dull grayish; tarsi bluish, greenish or bluish-green.

Length, males, 9.75-16.3 mm.; width, 3.25-6.60 mm.

Length, females, 11.25-18.00 mm.; width, 3.90-7.00 mm.

This is the most common species of the genus found in the United States, but very little concerning its habits and life history seems to be known. Mr. H. B. Kirk has reared it from *Saperda concolor* galls on large-toothed aspen (*Populus grandidentata*), collected at Mulford, Pennsylvania. Several writers state that specimens have been "beaten from poplar" and "taken resting on poplars."

Blanchard<sup>1</sup> says:

"*P. cyanipes* Say. One specimen on the trunk of a poplar. June, Mass."

Frost (letter).

"*P. cyanipes*; Providence, R. I., beaten from poplar by I. V. Nylen."

Distribution: Awame, Manitoba, VII-2; Ontario; Edmonton, Alberta, VII-30; Millers, Ind., VII-2; Wales, Me., VIII-3; New Jersey; Framingham, Mass., VI-6, *Salix*; Cicero, Ill., VIII-1; Buffalo, N. Y.; White Fish Point, L. S.; Texas; Isle Royal, Mich.; and Awame, Manitoba (Swaine), August 9. Blatchley reports this species as occurring on pine, sycamore, and ash in northern Indiana. It is very doubtful if it breeds in any tree other than *Salix* and *Populus*.

**Pæcilonota cyanipes** var. **californica** new variety. Plate V, figs. 7 and 8.

A western form differentiated by a broader, more robust body; thorax angulated and widest at the middle, more coarsely and unevenly punctured; apices of elytra less prolonged and less divaricated, always cupreous. The last ventral segment differs as shown in figures 5 and 7 of Plate VII. Some fifty specimens examined, all are very uniform in color and shape except a single example from Yukon (which is almost black). General ground color is coppery bronze with elongate raised areas of a greenish color on the elytra.

Taken on aspen (*Populus tremuloides*) at Vade, California, by Mr. H. E. Burke. Quite common on the same tree at Strawberry and Phillips Station on the Placerville-Tahoe road, Eldorado County, California, where the author took some thirty specimens in about one hour

<sup>1</sup> Blanchard, F., *Entomologia Americana*, Vol. V, 1889, page 30.

on July 4, 1919. A number of specimens were seen from Cascade,<sup>1</sup> Idaho, and one from Iron County, Utah; Humbolt County, California; Klamath Falls and Ashland, Oregon.

The larvæ, pupæ and mature adults of this species were dug from living aspens (*Populus tremuloides*) in Grant County, Oregon, June, 1914. They were found most frequently in the smaller trees, where they caused patches of the bark to turn black and at times peel off. Their mines have a tendency to extend horizontally much more than vertically, causing swellings on the trunk. The trees seem to suffer little from the attacks, as they retain their thrifty appearance in spite of the borers, whose mines often extend to the very center of the tree.

Enemies. Two species of parasitic Hymenoptera were taken from the mines.

***Pæcilonota costicollis* Laporte and Gory.<sup>2</sup>**

This species was described and figured by Laporte and Gory as *Buprestis costicollis* in 1841.

It is stated that the species was taken in large numbers in Louisiana. It is undoubtedly identical with *P. thurecura*, which Say described from Louisiana in 1832.

***Pæcilonota erecta* Gory.**

The (*Buprestis*) *P. erecta* of Gory was described<sup>3</sup> from a specimen named but not described by Dejean in 1837. It is impossible to separate *erecta* from the variable *cyanipes* of Say. It has been placed in synonymy by many others and attempts have been made from time to time to revive the name as a variety and occasionally to give it specific standing. However, no author has yet brought out any definite character by which it can be separated from *cyanipes*. The latter being a species of very wide distribution is bound to present considerable variation, and, as pointed out in the discussion of that species, there are several color phases; but if one attempts to base a species on color

<sup>1</sup> Specimens from Idaho and eastern Oregon have a more roughly punctured thorax, striae intervals more elevated and prominent and are of a more greenish color.

<sup>2</sup> Laporte et Gory, Monographie des Buprestidæ, Vol. IV, p. 109, pl. 19, fig. 107, 1841.

<sup>3</sup> Laporte et Gory, Monograph des Buprestidæ (Suppl.), p. 110, pl. 19, fig. 108, 1841.

variation, the division of this species into subspecies and varieties might be carried on indefinitely.

***Pæcilonota ferrea*** Melsheimer. Plate VI, figs. 11 and 12.

"*D. Ferrea*. Brassy-brown above, profoundly rugose punctured; thorax with a glossy dorsal line. . . . 7 (lines) long,  $2\frac{3}{4}$  (lines) wide. Virginia.

"Brassy-brown above; head slightly impressed, rugosely punctured; eyes yellowish-brown, thorax equal, confertly rugose-punctured; medial space glossy, black, each side of which, at the anterior margin, with a small black, polished spot, and a similar one each side, at the posterior margin; posterior angles rectilinear: scutellum transverse, concave: elytra punctured, and with rows of glossy oblong-quadrate spots; lateral submargins transversely rugulose and with irregular, elevated glossy spots and short lines; tips narrowed, short, bidentate; feet and beneath dull cupreous, rugosely punctured: pectus slightly canaliculate.—Received a female specimen, and the only one in my collection, from Professor Haldeman." <sup>1</sup>

***Pæcilonota ferrea*** Mels. (Redescribed.)

Oval in form; brassy greenish above, but ordinarily presenting a light grayish color, due to the presence of short white pubescence and of a downy-like substance in the punctures. Antennæ (male) with basal segment cylindrical and coppery, remainder flattened greenish with slight brassy tinge clothed with long bristle-like hairs, front rugosely punctured with irregular, elevated shining area on upper half; thorax bisected by a rather wide, elevated, dark, shining area, this elevated area interrupted by deep, round punctures, extends laterally from the median line, one half the distance to the lateral margin, thence to the margins the area is deeply, closely, rugosely punctate. Sides regularly arcuate with the widest point just in front of the middle. Scutellum transversely elongate, quadrate. Elytra with few scattered punctures; first five intervals distinct, except near the apex, where they become broken up. The surface of elytra broken by short transverse rugose lines and elevated spots which are either brassy green or greenish-black. Surface covered with scattered, short, white, bristle-like hairs, more numerous near the apex. Apex not much prolonged, more or less distinctly bidentate. Beneath coppery bronze, punctate, the punctures small, scattered along the median portion, larger, deeper and

<sup>1</sup> Melsheimer, F. E., Descriptions of New Species of Coleoptera of the United States in Proceedings of the Academy of Nat. Sci. of Philadelphia, Vol. 2, pp. 144-145, Nov., 1844.

more numerous laterally, each puncture giving rise to a long, fine, white hair, and filled with a cotton-like substance. Male: prosternum densely clothed with long hairs. Last ventral (Pl. VII, fig. 1) widely and deeply sinuate; apices angulated.

Length, from 13 to 16 mm.; width, 5 to 6 mm.

Female: prosternum with few or no hairs. Last ventral (Pl. VII, fig. 2) with shallow sinuation points rounded. Antennæ with first three joints coppery.

Length, 15 to 20 mm.; width, 5.5 to 8 mm.

Twenty-four specimens examined: 13 males and 11 females from Millers, Indiana, and Cicero, Illinois, taken on poplar from July 9 to August 18.

The series of *ferrea* examined show practically no variation other than in size. The greenish-bronze color and the prominently bidentate elytral apices readily distinguish it from other species. So far as my observations go after examining the specimens in a number of collections, this species seems to be rare except in the vicinity of Millers, Indiana. Melsheimer gives the type locality as "Virginia," and a specimen in the American Museum is also labeled Virginia. A specimen in the National Museum is labeled Duluth, Minnesota, and another Williams, Arizona, VI-19.<sup>1</sup> All other specimens seen were from Cicero, Illinois, or Millers, Indiana. No host has been mentioned in connection with this species other than poplar.

LeConte, 1859, p. 204, says, "*P. ferrea* Mels. One specimen western states, others Missouri," and adds, "This species differs from *thureura* by the narrow form and more flattened thorax; the sides of the thorax diverge a little from the base, so that the widest part is about the middle. It is true that the thorax of *ferrea* is widest at about the middle, while in *thureura* it is widest behind the middle. The body, however, certainly is not narrower in form than *thureura*, if either species presents a narrower form; on the whole, it will be *thureura*."

***Pæcilonota debilis* Leconte.** Plate V, fig. 3.

"5. *P. debilis*, cupreo-ænea, thorace subtransverso, a basi antrorsum angustato, lateribus late rotundatis, rude punctato, costa dorsali latiuscula lævi, alteraque vix distincta, elytris striatis, præcipue confertim punctatis,

<sup>1</sup> Probably *cyanipes* var. *californica*.

spatiis obscuris lævibus variegatus, ad apicem truncatis vix bidentatis, abdominis apice integro. Long 48." <sup>1</sup>

Translation: Coppery-bronze, thorax subtransverse, base hollowed, narrowed, sides widely rounded, roughly punctured dorsal costa somewhat broad and smooth, scarcely distinct (separated) from the others, elytral striæ (especially) quite closely punctate, variegated by obscure smooth spaces, truncate at the apex, scarcely bidentate, the apex of the abdomen whole.

"One specimen, Baltimore, Mr. Wild. I was inclined to believe this a very small specimen of *P. thureura*, and on comparison I find no satisfactory character except size upon which to rest its distinction. Nevertheless the last joint of the abdomen is rounded at the tip, which distinguishes it at once from either sex of the preceding. From the absence of hairs on the prosternum, I suppose that the specimen is a female."

This species is known only by the type and there seems to be little to add to the above. The status of a species erected from a single female is hard to determine. The fact that the last abdominal segment is rounded and almost entire (Pl. VII, fig. 13) certainly seems to separate this single known example from any of our other species. The type is in the LeConte collection at Cambridge, Massachusetts.

#### *Pæcilonota cupripes* Casey.<sup>2</sup>

Specimens have been noted which fit Colonel Casey's description, but the differences are only those one would naturally expect in a species of wide distribution. A large series shows such forms to grade into the typical *cyanipes*. The "more blackish" color is noted in specimens from Texas and Lake Superior region; the "obscure bronze" antennæ in typical examples from Indiana. The scutellum varies greatly in size, shape and color throughout the species, and the prosternum may be either flattened or convex; in a few examples it appears to be slightly concave. The sinuation of the last ventral segment varies and in the male of typical *cyanipes* it may be abrupt, twice as wide as deep and the apices acute or rounded.

The matter of what constitutes a valid species is certainly a matter of opinion, but unless definite stable characters can be pointed out it

<sup>1</sup> From pp. 204-205 of Leconte, Revision of the Buprestidæ of the United States, Trans. of the Amer. Philosophical Society, Nov., 1859, Vol. 11.

<sup>2</sup> Casey, Studies in American Buprestidæ, Proc. Wash. Acad. Sci., XI, pp. 168-169, 1909.

is the opinion of the writer that a species will not stand with the majority of workers. *P. cupripes* Casey can not be separated from *P. cyanipes* Say with any degree of certainty and therefore should be considered a synonym of the latter.

***Pæcilonota parviceps* Casey.<sup>1</sup>**

The description of *parviceps* is evidently drawn up from a large female and no definite characters are given to distinguish it from *P. cyanipes*.

***Pæcilonota bridwelli* Van Dyke.<sup>2</sup> Plate V, figs. 4 and 5.**

"Elongate-oval, subdepressed; brassy-green with the exception of the antennæ and tarsal joints which show a cupreous tint; the front and prosternum moderately densely clothed with long white hair, the surface elsewhere including the pronotum and elytra more sparsely clothed and with shorter and more depressed pile; the depressed areas above and the greater portion of the under surface coated with a white powdery substance; antennæ not reaching hind margin of pronotum; front slightly sulcate and coarsely punctured; pronotum less than three fourths as long as broad, side margins almost straight and parallel for posterior three fourths then gradually rounded to apex, disc with smooth median elevated longitudinal line extending from base to apex and broadest at middle, with a shallow and equally broad depression on either side, a secondary, punctured, and irregular ridge outwardly bounding these, the sulci and sides coarsely and cribrately punctured; elytra three times as long as pronotum and slightly broader at humeri, side margins almost straight and parallel for anterior two thirds, thence suddenly narrowed and slightly sinuate at apex, the tips hardly prolonged, but slightly divergent, and truncate at apex, the disc with intervals 1-5 distinctly elevated, rounded, and continuous throughout greater portion, intervals 7 and 9 equally elevated but frequently and broadly interrupted, intervals 6, 8 and 10 less evidently elevated and more interrupted, the more continuous intervals coarsely punctured at irregular distances, the striae finely punctate; the underside in front rather finely and sparsely punctured in median area and more coarsely and cribrately so at sides, the abdomen with a smooth area down the middle and with sides coarsely and aciculate punctured. Length 13 mm.; breadth 4.5 mm."

"♂. Prosternum rather densely clothed with long silky white hair and the last ventral (Plate VII, fig. 11) deeply and broadly emarginate."

"♀. Prosternum less densely clothed and with shorter hair and the last ventral (Plate VII, fig. 12) with small triangular incisure."

<sup>1</sup> Casey, Studies in American Buprestidæ, Proc. Wash. Acad. Sci., Vol. XI, pp. 168-169, 1909.

<sup>2</sup> 1918, Van Dyke, New Species of Buprestidæ, etc., Ent. News, XXIX, p. 53.



"The description given above was based upon a single male. The only other specimen seen, the companion female, differs somewhat as regards the sculpturing of the elytra, all of the intervals here being broadly and frequently interrupted so that they present a chain-like or catenulate appearance instead of the more or less regular one which is observed in the male."

"This species differs materially from our other species, by its uniform brassy color, its more evident hairiness, the more distinctly defined longitudinal sulci of the pronotum and the greater elevation of the elytral intervals, resembling in this last regard some of our *Dicer-cas*, such as *D. tenebrosa* Kirby."

"Type male and female from Imperial County, California, June, 1911, collected on flowers by Mr. J. C. Bridwell. The type male in my own collection, the type female in the collection of the University of California. The species named in honor of the collector." Van Dyke.

There seems to be little additional information concerning this rare species. In a recent letter Dr. Van Dyke writes:

"There are two specimens in the National Museum Collection from southern Arizona."

**Pæcilonota montanus** new species. Plate V, figs. 1 and 2.

Form oblong, oval, flattened; antennæ greenish; front very roughly sculptured, clypeus purplish-bronze and broadly arcuate; vertex with a smooth elevated space extending a short distance towards the clypeus; down the center of this space runs an impressed line. Ground color of the dorsal surface very dark brassy-green, almost black, due to presence of numerous white hairs and small tufts of a cotton-like substance on the unpunctured areas the beetle presents a grayish appearance. Thorax with a median, elevated, smooth line which broadens at the anterior and posterior margins and is flanked on each side at the middle by an irregular, elevated space, entire surface roughly sculptured due to coarse, deep, irregular punctures with elevated smooth margins, the punctures larger near the lateral margins. Scutellum large, transverse and angulate behind. Elytra with the first five intervals convex, entire and prominent, others more or less prominent but interrupted. The whole surface has a very fine granulate appearance; punctures are few and widely scattered, not prominent. Beneath greenish-bronze; prosternum densely clothed with long, white hairs. Last ventral segment (Pl. VII, fig. 9) with a deep, wide, quadrate emargination.

Length of male 15.00 mm.; width 6.50 mm.

Length of female 17.50 mm.; width 7.75 mm.

Female differs by its larger size, darker color, basal joints of antennæ

more brassy. The upper surface lacks the cotton-like tufts, punctures more numerous. Under parts more bronze in color, prosternum punctured and sparsely pubescent; last ventral segment (Pl. VII, fig. 10) very convex, narrowed, with a deep (median), wide, rounded emargination.

Type ♂ and ♀ in author's collection; paratypes sent to Mr. H. E. Burke.

Described from four specimens collected by Mr. J. Brunner at Missoula, Montana, June 16, 1916, on Black Cottonwood (*Populus trichocarpa*). Specimens kindly sent me by Mr. Burke.

Only one other specimen has been seen, a female taken at Makinah, Manitoba, and sent me by Dr. J. M. Swaine, Forest Entomologist for the Dominion Government.

***Pæcilonota fraseri*** new species. Plate V, fig. 6.

Form oblong oval, not flattened, strongly convex, longitudinally; antennæ brassy purple, with numerous fine white hairs, first joint slightly longer than second and one and one half times as great in diameter; front roughly sculptured with a broad, elevated, dark green, grooved line extending down about one third the distance to the clypeus, thence dividing to form an inverted Y, remainder of the front brassy violaceous with long, fine, white pubescence; a transverse ridge separates the clypeus from the front. Ground color of the dorsal surface very dark violet, almost black; thorax with a broad median smooth space extending from posterior to anterior margins (very prominent, being about one half millimeter in width); irregular elevated areas and lines occupy a considerable portion of the thorax; punctures of the thorax medium in size, quite rounded near the median line, larger and more irregular in shape near the lateral margins, and separated by irregular, strongly elevated, smooth lines; scutellum broad, rounded in front and sinuate behind; lateral margins of the thorax rounded, strongly constricted in front; elytra with first four intervals entire, prominent; fifth and sixth intervals distinct near the middle; punctures fine and scattered, shoulders a little more densely punctured; elytra widest behind the middle, narrowing strongly towards the tips; apices short, strongly divergent, tips strongly emarginate (Plate V, fig. 6). Beneath purplish-bronze, finely, rather densely, punctate except along the middle, quite densely pubescent; prosternum smooth and shining along the middle with a few large punctures near the border from which protrude long, fine, white hairs; last ventral segment rather broadly evenly emarginate (Plate VII, fig. 14).

Length male 13.5 to 15 mm.

Width male 5.0 to 6 mm.

Two specimens (males) examined. The type collected on the Fraser River in British Columbia by "Weldt" and loaned me by Mr.

Alan Nicolay, of Brooklyn, N. Y. The other specimen bears the date 5-6-99 and a number 226, taken in Canada, exact locality not given, sent me by Dr. Swaine.

The species resembles *montanus* more than any other of our species, but is easily separated from this as well as all other species of the genus by the convex body and the elytral apices (see fig. 6, Plate V). The width of the body is greater in comparison to the length than in any other of our species.

#### ACKNOWLEDGMENT.

I am deeply indebted to the following: Dr. Nathan Banks, who secured for me a photograph of the type of *P. debilis* Lec. and also sent a sketch of the last ventral segment of that species. To Dr. E. C. Van Dyke, who sent in the photographs of the type ♂ and ♀ of *P. bridwelli* and the drawings of the last ventral segment of this species. To the following gentlemen who kindly loaned material from their collections: Mr. Warren Knaus, C. A. Frost, H. E. Burke, Dr. J. M. Swaine, Alan Nicolay, C. W. Leng, Chas. Liebeck, H. W. Wenzel and Frank R. Mason.

To Professor B. B. Fulton of this station for recopying the drawings and to Professor F. H. Lathrop for assistance in photographing certain species.

#### EXPLANATION OF PLATES.

##### PLATE V.

- FIG. 1. Male *P. montanus* n. sp. Type.
- FIG. 2. Female *P. montanus* n. sp. Type.
- FIG. 3. Female *P. debilis* Lec. Type.
- FIG. 4. Male *P. bridwelli* Van Dyke. Type.
- FIG. 5. Female *P. bridwelli* Van Dyke. Type.
- FIG. 6. Male *P. fraseri* n. sp. Type.
- FIG. 7. Male var. *californica* n. var. Type.
- FIG. 8. Female var. *californica* n. var. Type.
- FIG. 9. Male *P. thureura* Say.
- FIG. 10. Female *P. thureura* Say.

##### PLATE VI.

- FIG. 11. Male *P. ferrea* Mels.
- FIG. 12. Female *P. ferrea* Mels.
- FIG. 13. Male *P. cyanipes* Say.
- FIG. 14. Female *P. cyanipes* Say.

## PLATE VII.

- FIG. 1. Last ventral segment of male *P. ferrea* Mels.  
 FIG. 2. Same female.  
 FIG. 3. ♂ *P. thureura* Say.  
 FIG. 4. ♀ *P. thureura* Say.  
 FIG. 5. ♂ *P. cyanipes* var. *californica* n. var.  
 FIG. 6. ♂ *P. cyanipes* Say.  
 FIG. 7. ♀ *P. cyanipes* var. *californica* n. var.  
 FIG. 8. ♀ *P. cyanipes* Say.  
 FIG. 9. Last ventral segment ♂ *P. montanus* n. sp.  
 FIG. 10. ♀ *P. montanus* n. sp.  
 FIG. 11. ♂ *P. bridwelli* Van Dyke.  
 FIG. 12. ♀ *P. bridwelli* Van Dyke.  
 FIG. 13. ♀ *P. debilis* Lec.  
 FIG. 14. ♂ *P. fraseri* n. sp.
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## NOTES ON A RARE BUPRESTIS.

BY W. KNAUS,

McPIERSON, KANSAS.

**Buprestis confluenta** Say, 1823.*Buprestis confluens* Leconte, 1859.*Buprestis tessellata* Casey, 1909.

As an example of the laconic taxonomic style of the most famous early North American entomologist, Thomas Say, his description of this species is given as it appears on page 60 of Say's American Entomology, Vol. I, John L. Leconte Editor London Edition, Henry Sothern & Co., 136 Strand, 36 Picadilly and 10 Tower Street, City, 1859:

"*Buprestis Confluenta* [*Confluens*].—Specific character. Green, polished, punctured; elytra with confluent yellow spots.

"*Buprestis confluenta* nobis, Jour. Acad. Nat. Sci., Vol. III, p. 159.

"Desc. Body bright green, punctured; head densely and confluent punctured; an obsolete indented longitudinal line, more distinct on the vertex: antennæ purplish, the basal joint rufous: thorax densely and confluent punctured, more particularly on the anterior and lateral margins; in the middle of the disk, these punctures are somewhat sparse: scutel rounded, convex: elytra striate, slightly tinged with violaceous; the striae and inter-



1



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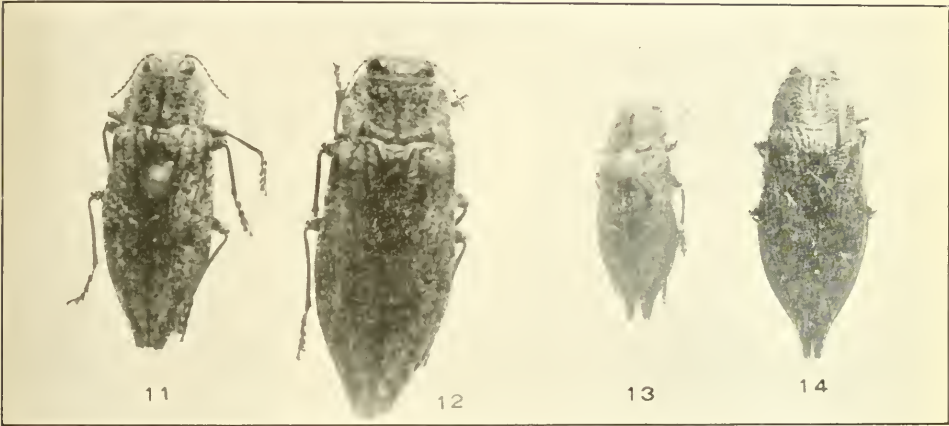
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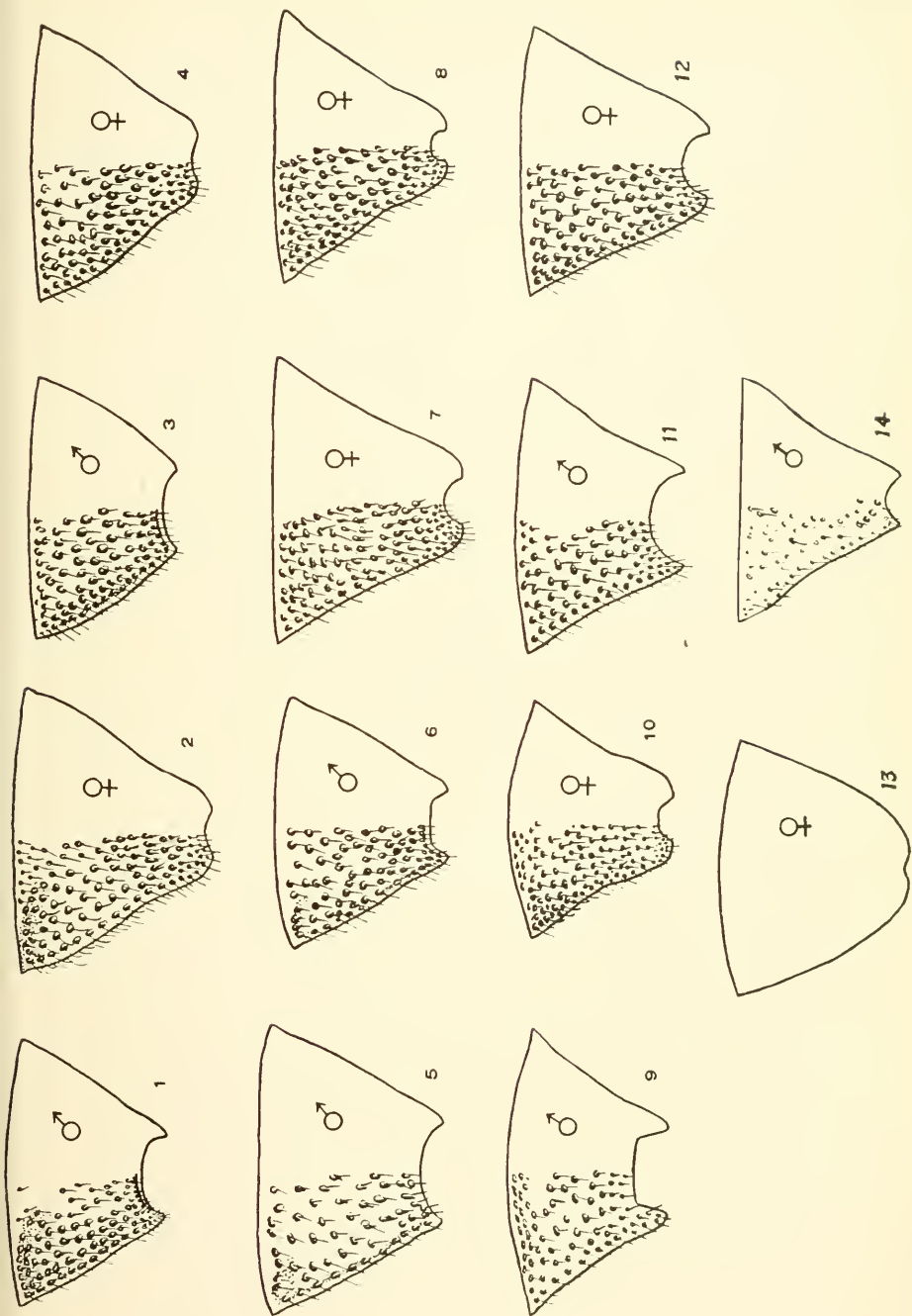






PÆCILONOTA.







stitial lines, slightly punctured; very numerous transversely confluent light yellow dots: tip slightly obliquely truncated, acute at the suture, but not mucronate or dentate: edge entire; tarsi purplish-brown.

"Obs. I can not find any notice of this very fine insect in any attainable author, and having never obtained an individual in the Atlantic States, I think it highly probable that it is altogether limited in its range to the Western region.

"A specimen was presented to me, when at Fort Osage on the Missouri River, by Lieut. Scott, of the Rifle regiment, a gentleman, whose extraordinary skill as a marksman has almost passed into a proverb in that country. I obtained two other specimens during the progress of Major Long's exploring party towards the mountains.

"The thorax varies in being in some specimens of a bright blue color, in others purplish."

Although described almost one hundred years ago, this brilliantly colored species has remained rare in collections. In a collecting experience of 37 years the writer has only taken four specimens: a female at Edmond, Norton County, Kansas, in July, 1885; a female at Salina, Kansas, in 1889; a male at Canadian, Tex. (dead, from a cottonwood stump), in 1903, and a female at Crow, Colo., 35 miles southwest of Pueblo, June 28, 1918.

J. W. McColloch and W. A. Hays, of the Department of Entomology at the State Agricultural College, Manhattan, Kansas, while collecting *Cotalpa lanigera* Linn. from willows and cottonwoods along the Kansas River, June 23, 1920, found *Buprestis confluenta* in abundance feeding and breeding on the young cottonwoods. Not recognizing the rarity of the species, they collected only 34 specimens when they could have taken scores more of them.

Col. Thos. L. Casey in his publication on Buprestidæ in 1909 gave a lengthy description of the species based on the specimen I sent him taken at Edmond, Kansas. His description of *B. tessellata* was also made from the specimen I sent him from Canadian, Tex. The Agricultural College, Department of Entomology, having placed the material collected last June in my hands for study, I find there is no doubt that Col. Casey's *tessellata* is a synonym. The chief characteristic of *tessellata* is in the yellow medial ventral surface. The Manhattan material shows this to be a sexual character, the males having the

yellow markings. Professor McColloch verifies this by saying several pairs were taken, the males showing the yellow markings.

My studies show the following:

Of the 34 specimens collected at Manhattan 10 were males.

Length of females, 20 mm.

Width of females, 7 mm.

Length of males, 16 to 17 mm.

Width of males, 5 to 6 mm.

These measurements are all larger than those given by Col. Casey.

The yellow dots on the elytra average more nearly confluent on males. Fascia at apical third extends toward apex and along suture to apex. Apex of elytra always coppery. Thorax green to blue-green. Smooth medial area of thorax brassy. The more brassy the thorax the more pronounced the coppery ventral surface.

Of the ten males one shows the pro-meso- and metasternum light yellow. Another male, metasternum light yellow; no other yellow ventrally. Another male, metathorax yellow, widening toward apex. Meso- and metasternum centrally yellow. Lateral mesosternum and meso-episternum each with an inconspicuous yellow dot. First ventral centrally yellow, widening apically, with central streak green. Inconspicuous lateral yellow dots. Second ventral, two medially placed yellow dots lengthened laterally. Third ventral, two small medio-laterally placed yellow dots. Fourth ventral with a central yellow line parallel with ventral suture. Fifth ventral, yellow line basally on right extending to near margin. Left side, a yellow dot. Underside of posterior femurs yellow. Thorax, apical angle tipped with yellow. Basal angle with yellow line extending along margin one third of length of thorax. A short yellow line parallel to marginal line, one third of distance from margin to central smooth spot.

Another male marked as in preceding except that lateral yellow dots are lacking on meso- and metasternum, and meso-episternum, and laterally on first ventral. The yellow lines on the fifth ventral are equal in length on each side. Thoracic yellow lines more restricted than in preceding species; yellow spots on elytra more nearly confluent than the average specimen.

From the above descriptions it is evident that there is marked variation in individuals of this species.



## A NEW LEPIDOPTEROUS ENEMY OF YELLOW PINE IN OREGON.

BY W. J. CHAMBERLIN,

FOREST ENTOMOLOGIST OREGON AGRICULTURAL COLLEGE.

*Coloradia pandora* Blake Fam. (SATURNIDAE).

The genus *Coloradia* was erected by Blake<sup>1</sup> for the species *pandora* in 1863 and the description was based on a single specimen from "Pikes Peak, Colorado Territory." Barnes<sup>2</sup> described *C. doris* as a new species from Salida and Greenwood Springs, Colorado. Dyer<sup>3</sup> lists *doris* as a variety and gives the distribution of the species as "Rocky Mountains." Holland<sup>4</sup> gives the range as "Eastern foot hills of the Rocky Mountains to the Cascades and from Montana to Mexico." Comstock<sup>5</sup> simply states that *Coloradia* is the lowest genus in the family Saturniidae, and that it is a rare insect from the West. Other than the original description and the few remarks quoted above, I have found no reference to this species in our literature.<sup>6</sup> The moths seem to be represented but rarely in collections, yet in certain localities they appear in large numbers at times.

### DESCRIPTION:

Eggs 2.5 mm. long by 2 mm. in width, flattened on both upper and lower surfaces, pale bluish-green color and semi-transparent when deposited, later, becoming opaque and of a duller green. The upper surface has a tendency to shrink, becoming strongly and irregularly depressed. The eggs are deposited in clusters of from six to seventy-four on the trunks of yellow pine.

<sup>1</sup> Blake, C. A., Proc. Ent. Soc. Phila., 11, p. 279, 1863.

<sup>2</sup> Barnes, Wm., Can. Ent., XXXII, p. 46, 1900.

<sup>3</sup> Dyer, H. G., U. S. Nat. Mus., Bul. No. 52, p. 74.

<sup>4</sup> Holland, W. J., The Moth Book, p. 91, 1903.

<sup>5</sup> Comstock, J. H., Manual for the Study of Insects, 1917, p. 350.

<sup>6</sup> Since the above was written Dr. J. M. Aldrich informs me that he has secured caterpillars from the Mono Lake region in California and reared the adults which are *C. pandora*. The species attacks Jeffrey Pine in the Mono Lake region and the Indians gather and dry the larvæ, which are used for food. See JOURN. N. Y. ENT. SOC., Vol. 20, page 28.

The larva, when first hatched, is black or brownish with a black head, hairy and 5 mm. in length. The full-grown larva measures over two inches in length and is greenish in color.

The Adult. Color brownish-gray, antennæ yellow, biserrate a little longer than the thorax. Thorax clothed with short soft hairs. Abdomen above dark brown, sides grayish, apex tufted extending beyond the wings. Wings semi-transparent. Forewings with two indistinct oblique wavy brownish bands, the exterior one paler, space between the bands sparsely clothed with white scales, a small distinct black spot on the discal nervure. Hind wings with an indistinct cloudy band, broader at the interior margin, gradually tapering to the exterior. A pale brownish spot on the disc. Base of wings clothed with pale pinkish hairs, cilia at the extremity of the veins whitish. Underside brownish-gray, tinged with pink, the discal spots more distinct than on upper surface. Length of body ♀ 1.35 ♂ 1.2 inches, expanse ♀ 3.4 ♂ 2.7 inches.

#### LIFE HISTORY AND HABITS:

Egg deposition occurs over a period of two to three weeks in July <sup>1</sup> and the young larvæ begin to emerge the last week in August and continue emerging for about two weeks. The larvæ leave the egg by gnawing out one end of the shell. The larvæ are voracious feeders and rapidly defoliate the pines. Complete data on life history has not yet been secured. The adults appear in late June and early July. The fact that no adults were noticed in 1919 and no grown caterpillars appeared in 1920 leads to the belief that the life cycle covers a period of two years.

#### ECONOMIC IMPORTANCE:

During the summer of 1919 the larvæ appeared in great numbers near Calimus Butte on the Klamath Indian Reservation and practically stripped the needles from all but the largest yellow pine (*Pinus ponderosa*) trees on ten sections lying in Twp. 33 S., R. 10 E., Twp. 36 S., R. 12 E., and Twp. 31 S., R. 9 E. During the summer of 1920 no caterpillars appeared, but thousands of the moths were present to deposit their eggs upon the trunks of the trees and even upon the debris of the forest floor. After mating and depositing eggs the adults die,

<sup>1</sup> On Klamath Indian Reservation in Oregon.

and their bodies were so numerous around the trunks of the previously defoliated trees that a pile two feet across and a foot high was raked from around a single tree. The trees which were defoliated in 1919 had, in August, 1920, a very sparse crop of new, short, light green needles, and these will probably be destroyed in the fall by the new generation of caterpillars which were emerging September 1, 1920. A second defoliation will undoubtedly kill the trees either of itself or indirectly by so weakening them that *Dendroctonus brevicomis* will enter.

The moths appear to be spreading from this center, as many individuals were picked up at Chiloquin and Klamath Falls,<sup>1</sup> where they had probably been attracted to the arc lights. A few individual specimens were found, by Mr. J. C. Patterson, as far west as Jenny Creek in Jackson County.

#### CONTROL:

Undoubtedly there are natural enemies of this moth present, but the limited time spent in the locality precluded the possibility of ascertaining what parasites were there and to what extent they existed. The larvæ would undoubtedly succumb to any of the ordinary poison sprays, but the cost of spraying large forest trees would be enormous and only justifiable as a coöperative proposition to prevent the spread of the moth to adjacent territory. The limited area in which they now occur might well be cleaned up at a moderate cost, thus making sure that the surrounding territory would be protected for some time to come.

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### MISCELLANEOUS NOTES.

**The Position of the Dioptidæ (Lepidoptera):** In my paper in *Psyche* (23: 191) I note the Dioptidæ as lacking a tympanum. More careful study shows the tympanum is present, though very small and unspecialized in the typical forms, so that the family falls naturally at the foot of the series leading up to the Notodontidæ, Noctuidæ and Arctiidæ, having an upright egg, a larva with uniordinal hooks and metathoracic tympanum; in fact, at present the family is not really distinguished from the Notodontidæ in any very tangible way. The

<sup>1</sup> About 40 miles from the center of infestation.

enlarged spiracle, noted by Prout, I have not been able to verify. In practice there is never any confusion with the Notodontidæ, but with the Geometridæ, a structurally widely separated family.—WM. T. M. FORBES.

**Stridulation in Another Family of Lepidoptera:** Stridulation has already been reported in a few Lepidoptera (Nymphalidæ, Noctuidæ, Agaristidæ). Last year, collecting a few miles back of El Encanto in the Putumayo district of South America, several males of the Dioptid, *Euchontha sublactigera*, were taken which made a loud squeaking sound in the net. The stridulating organ is undoubtedly the highly modified fore wing, with the raised file-like veins M<sub>1</sub> and 2. The female was not observed, but undoubtedly is silent and has the venation unmodified.—WM. T. M. FORBES.

**Haploa and Callimorpha (Lepidoptera):** The Old World genus *Callimorpha* and the nearctic *Haploa* appear to form the connecting link between the Hypsid-Pericopid series and the Arctiidæ. The larvæ of the two are identical in structure and unlike either of the related types, having two subventral warts on each of the first two segments of the abdomen, unlike the Arctiidæ, and wart *iv* in its normal place behind the spiracle on the seventh segment of the abdomen, as in the Arctiidæ and unlike the Pericopidæ. The true Hypsidæ, which are confused with the Pericopidæ by Hampson and others, appear to have the tufted hair much reduced, but have not been properly studied, unless possibly *Doa*, studied by Fracker, can belong to the family. In the imago the same intermediate condition occurs, as the base of Sc of the hind wing is much swollen, as in the Arctiidæ, while the fusion of Sc and R is shorter than in any other known Arctiid, and in *Callimorpha* as short as in some Pericopidæ. In the Hypsidæ the two veins are separate.

Until more of the exotic larvæ are known it would probably be best to retain the two genera in the Arctiidæ, where they have been generally placed. In any case, there seems little to gain by separating them from each other as Hampson has done. If not specially allowed for both alike would run to the Noctuidæ in a key, not to either Arctiidæ or Hypsidæ. Of course, this makes the use of the name Callimorphidæ for the Hypsidæ or Pericopidæ impossible.—WM. T. M. FORBES.

**An African Pterothysanid (Lepidoptera):** In Hampson's recent revision of certain small families the Pterothysanidæ stand represented by a single Oriental genus, of very few species. Lately the Madagascar *Caloschemia monilifera* has come to hand, and proves to be a second Pterothysanid, very close to *Pterothysanus*, perhaps not generically distinct. The venation is the same and in both the frenulum is rudimentary (not absent as generally stated). The tympanum is absent, the metathorax being well chitinized and simple in type, practically like the mesothorax at first glance. This shows there is no connection with the Liparidæ or Hypsidæ, where the genus *Caloschemia* now stands. The free  $R_5$  (vein 7) is also practically unique. Both have the angulate Sc and brace-vein of the hind wing characteristic of the Geometridæ and Callidulidæ, which are probably the closest relatives. The two genera may be distinguished as follows:

*Pterothysanus*: Palpi drooping, hairy below, fringe on inner margin of hind wing extremely long.

*Caloschemia*: Palpi porrect, smooth-scaled and rather longer, inner margin with fringe more moderately lengthened.

The family will be another of those interesting links between the Malagasy and Oriental regions, like *Euplaa* and *Papilio antenor*.—WM. T. M. FORBES.

**Notes on Katydids.**—In this JOURNAL for March, 1920, it is stated that the one-time very abundant katydid, *Pterophylla camellifolia* (Fabricius) was becoming extinct within the limits of New York City. For several years search had been made on Staten Island, where it was once very common, but none had been found. During the summer of 1921 Miss Miriam Campbell discovered a small colony of this species in the mixed growth of pines, oaks, etc., extending along the northerly boundary of the Moravian Cemetery. Search was continued in other parts of the Island, but no additional *Pterophylla* were located. Mr. S. Harmsted Chubb, of the American Museum of Natural History, heard four or five katydids in 1921 near 250th Street, between Van Cortlandt Park and the Hudson River.

It is also worth while to record that the oblong-winged katydid, *Amblycorypha oblongifolia* (De Geer), was very scarce on Staten Island during 1921, while it was exceedingly abundant there in 1920.

As the eggs are known to require from two to three years to hatch, the insect will probably appear in numbers in 1922 or 1923.

While near Black Pond, Fairfax County, Virginia, on September 25, 1921, Mr. Clarence R. Shoemaker called the attention of the writer to a female *Amblycorypha rotundifolia* (Scudder) on a bush. It was a green example with the tegmina marbled with straw-color, which seems to be a rare variation. It is the only specimen so marked in the writer's collection. Straw-colored males have been found which sometimes have the tegmina spotted with small dots of a darker brown. Pink individuals are much more common in *oblongifolia* than in this species.—WM. T. DAVIS.

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## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

### MEETING OF FEB. 1.

A regular meeting of the New York Entomological Society was held at 8 P.M. on February 1, 1921, in the American Museum of Natural History. Pres. John D. Sherman, Jr., in the chair, with 14 members and one visitor present.

Mr. Edward Davis Quirsfeld, 523 4th St., Union Hill, N. J., was elected an active member.

A letter from Mr. R. P. Dow, absent in California, was read.

Mr. Nicolay gave the result of his examination of the Pselaphidæ of Mr. Davis' collection, calling attention especially to specimens of *Batrises foveicornis* from Amagansett, Flushing and Jamaica, Long Island, and of *Batrises globosus* from Staten Island, April 17th, 1908; and then read a paper on "Acmaeodera" illustrated by two boxes from his collection and blackboard drawings of the parts used in classifying the species by Prof. H. C. Fall, in his last revision. Some rare species from the collections of Beyer, Notman, Mason, Woodgate, Fisher, Rehn and Hebard were pointed out.

Mr. Wm. T. Davis, under the title "Insects from North Carolina," exhibited four large boxes of insects and stated that he and Mr. James P. Chapin of the American Museum of Natural History had visited North Carolina in June, 1920. Nine days were spent at Southern Pines where the tree frog *Hyla andersonii* and the carpenter frog *Rana virgetipes* were collected; the former has not previously been reported from North Carolina. Three species of Pitcher Plants, namely: *Sarracenia purpurea*, *Sarracenia flava* and *Sarracenia rubra*, grow in the vicinity of Southern Pines. While so fatal to many insects that are lured to their death by the leaves of these plants, there are nevertheless quite a number of species that either eat the substance



of the leaves or otherwise make use of them. Three specimens of the moth *Exyra semicrocea* Guénee, the larvæ of which feed on the leaves, were found in those of *S. rubra* on June 12th, and the next day a like number were discovered in the leaves of *S. flava*. Seven specimens of *Exyra ridingsii* Riley were found in the leaves of *S. flava*, while of *Exyra rolandiana* Grote, nine were collected in the leaves of *S. flava* and one in *S. rubra* at a locality several miles distant. Also several nests of the wasp *Isodontia harrisi* were found in both green or dead leaves of *rubra* and in a dead leaf of *flava*. The nests were stored by the mother wasp with nymphs of *Amblycorypha*, *Neoconocephalus* and *Orchelimum* or *Conocephalus*. In one instance there was a small colony of ants, *Dolichoderus plagiatus pustulatus* Mayr., in a leaf of *flava* below and separated from that of the wasp occupying the same dead leaf. Likewise a species of spider was found not uncommonly in many of the leaves, in which they had spun webs. This spider is to be described by Mr. Nathan Banks.

Among other insects exhibited from Southern Pines was a specimen of *Apantesis placentia* Smith and Abbot. The moth was figured by the describers who regarded it as an uncommon insect. They state that the caterpillar is a general feeder.

Mr. Gaudin exhibited part of the beetles he had found in Montana, where, near Philipsburg, he had seen 300 buprestids and longhorns ovipositing on a recently built line fence. One misguided female mistaking a stone drill core for a part of the fence was trying to deposit an egg in it also.

#### MEETING OF FEB. 15.

A regular meeting of the New York Entomological Society was held at 8 P.M. on February 15, 1921, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with 16 members and four visitors present.

Mr. Angell proposed for active membership:

Mr. Alfred Lesieski, 775 Forest Ave., Bronx.

Mr. Davis proposed for active membership:

Mr. H. Herbert Johnson, Jr., Box 2, Dept. of Zoölogy, Columbia University.

Mr. Davis read letters from absent members, Dr. H. H. Knight and Dr. A. H. Sturtevant, the latter giving an account of the flourishing entomological department in Stanford University.

Mr. Olsen read a paper "Studies in the genus *Cicadella*," illustrated by specimens, which will be printed in full.

Dr. Bequaert, under the title "Critical Remarks on Certain Genera of Caliphorine Flies," reviewed the "Revision des Muscidæ Testaceæ" by J. M. R. Surcouf in *Nouv. Arch. du Mus. d'h.n.*, Paris, Vol. VI, 1914 (published in Dec., 1919), with four plates drawn by L. Guyon; and exhibited specimens collected by himself in Africa. He described the life history as far as

known of several species, giving an interesting account of his success in capturing the species named after him when he had learned its habits. The Congo floor maggot, *Auchmeromyia luteola*, doomed to extinction as soon as the African natives adopt the habit of sleeping in bed instead of on the ground, the species infesting wart hogs, aard varks and other bare-skinned animals, the screw worm fly, the species of *Plormia*, destructive to nestling birds in California and Colorado, and other species living in wounds were described.

Dr. Demetrius Borodin, of Russia, gave a brief account of his work in Economic Entomology.

Mr. Davis spoke of the spiders he had found at Southern Pines, N. C., in the pitcher plant, saying that in addition to a new species to be described by Mr. Nathan Banks, that authority had identified among his captures three males of *Thanatidius tenuis* Hentz, heretofore unknown, probably because the male is short-lived.

Mr. Davis also showed egg masses of the Oriental Mantid, *Paratenodera sinensis*, and stated that he and Mr. Burns had recently found them very numerous on the low bushes and vines on the sandy ground east of South Ave., Mariners' Harbor, Staten Island, but had not been able to discover any on the westerly side of the Avenue. Some, however, had been taken across the road, and so it is hoped to extend the colony. He also showed twigs of the Oriental Sycamore from Tompkinsville, Staten Island, in which were great numbers of the scale, *Lecanium nigrofasciatum*, determined by Mr. Harold Morrison, and ants from the green-house of the Brooklyn Botanical Garden, which Prof. Wheeler had determined as *Tetramorium guinense* Fabr., a common species of the tropics.

Dr. Bequaert said the study of ants inhabiting botanical gardens was very likely to yield interesting results from the chance of foreign species being introduced with plants.

#### MEETING OF MARCH 1.

A regular meeting of the New York Entomological Society was held at 8 P.M., March 1, 1921, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with 16 members, and two visitors present.

Messrs. Alfred Liesiski and H. Herbert Johnson, Jr., nominated at previous meeting, were elected active members.

Mr. Davis exhibited a Farmers Almanac showing rainy season and temperature records in each State.

Mr. Barber spoke "On the Genus *Lygaeus*," illustrating his remarks, which will be printed elsewhere, by blackboard drawings and specimens.

Mr. Notman under the title "Some New Species of Carabidæ" exhibited a considerable collection received from A. B. Champlain, which included several new species of *Bembidion*, *Tachys*, *Celia*, *Pseudomorpha*, etc. Mr. Notman, with the help of blackboard drawings, explained the characters by which the new species were recognized, and their relation to related species.

Mr. S. G. Rich, present as a visitor, spoke briefly of his experiences in South Africa.

Mr. Davis announced the death on February 6, 1921, of Charles H. Sunderland, one of the Society's oldest members.

Mr. Wm. T. Davis exhibited the grasshopper *Conocephalus nigropleuroides* (Fox), female, collected on the salt meadow near Oakwood, Staten Island, September 14, 1914. He stated that Mr. H. Herbert Johnson, Jr., had collected a second female on the salt meadow near Old Place, Staten Island, September 8, 1920. The species was described from Cape May County, N. J., by Dr. Fox and has been reported by Rehn and Hebard from Ventnor, near Atlantic City, N. J. It has not been previously recorded from the State of New York. *Conocephalus spartinae* (Fox) is a common species on Staten Island, and has also been collected on Long Island.

#### MEETING OF MARCH 15.

A regular meeting of the New York Entomological Society was held at 8 P.M. on March 15, 1921, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with 28 members and two visitors present.

Mr. Nicolay reported for the Outing Committee, on excursion to Van Cortlandt Park and to the Palisades. Communications from World Metric Standardization Council, W. Dwight Pierce, W. J. Chamberlin and Warren Knaus were read.

Dr. Lutz read a paper on "Geographic Average, a Suggested Method for the Study of Distribution," which has been printed in American Museum Novitates, March 14, 1921. His method would substitute for such ambiguous terms as Arctic, Hudsonian, Canadian, etc., definite average degrees of latitude and longitude, calculated from the known distribution of the plants occurring within the region conceded to be Arctic, for instance. Such calculations, once carefully made, would furnish a definite index with which the flora of any particular locality could be compared or with which the average distribution of any particular species of plant or animal could also be compared. Provisional latitudinal averages, based on the distribution given in Britton & Brown's "Illustrated Flora," were:

Arctic.....	More than 52° N.
Hudsonian.....	48 or 49° N.
Canadian.....	44 or 45° N.
Alleghenian.....	41 or 42° N.
Carolinian.....	38 or 39° N.
Louisianian.....	Less than 34° N.

Dr. Lutz laid much stress on the fundamental studies of Merriam and of Allen, pointing out the early and valuable work of the latter in differentiating the arid and humid divisions of the warmer temperate region.

Discussion followed by many members, in the course of which Mr. Davis called attention to the faunal map prepared by Dr. John L. Leconte for the Smithsonian Institution (1859) whereon is shown the marked change that takes place in the fauna near the 100 meridian, and to Prof. Cyrus Thomas' Notes on the Saltatorial Orthoptera of the Rocky Mountain Region, 1872, where the statement is made that the eastern limit of the arid plains constitutes a more rigid boundary to the Orthopterous fauna than the dividing range of the Rocky Mountains.

Mr. Davis exhibited "Some New Cicadas from Western North America" contained in three boxes. The descriptions have been published in the JOURNAL.

Mr. Davis also exhibited the Proc. Ent. Soc. B. C.

Mr. J. W. Angell commented on the ease with which Cicadas are collected early in the morning and upon a convenient axe for collecting purposes.

#### MEETING OF APRIL 5.

A regular meeting of the New York Entomological Society was held at 8 P.M., April 5, 1921, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with 22 members and four visitors, including Dr. W. L. Tower, and several ladies present.

Mr. Frank Morton Jones delivered a lecture on "Food Plant Influence on Insect Specialization as exhibited by *Sarracenia* and *Exyra*," illustrated by lantern slides, original drawings, photographs and specimens from his herbarium and entomological collection.

The entire history of each species of pitcher plant and allied genera from New Jersey south to Florida and westward to California was given from Mr. Jones' personal experience; and the adaptations in the species of *Exyra* inhabiting them were traced with equal care through egg, larva, pupa and adult; of the adults dozens of specimens were shown.

After discussion by Messrs. Bird, Weiss, Notman, Davis and Dr. Bequaert, a vote of thanks, on motion by Dr. Lutz, was unanimously given to Mr. Jones. Dr. W. L. Tower, present as a visitor, spoke of Mr. Jones' lecture as a welcome contribution to our knowledge of the subject in its thorough statement of the facts, though he thought there might be some difference of opinion in their interpretation.

Mr. Leng announced the lecture at the Staten Island Museum on April 16th, by Dr. J. Chester Bradley, on his recent travels in South America.

#### MEETING OF APRIL 19.

A regular meeting of the New York Entomological Society was held at 8 P.M., April 19, 1921, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with nineteen members and seven visitors present.

The following new members were elected:

W. H. Southwick, 34 Gramercy Park, New York City.

Arnold H. Olsen, 128 West 97th St., New York City.

S. E. Cassino, Salem, Mass.

Mr. Hall exhibited "Some Butterflies from Mt. Washington" and described his experiences in collecting them and the differences in the season in the various years. His remarks covered particularly *Brenthus montinus*, *Grapta faunus* and *J-album*, *Colias eurymus* and *C. interior*, *Eneis semidea*. He called attention to the damage to the hind wings of one butterfly and asked if it could have been done by a bird. Messrs. Burns, Notman and Watson cited cases of birds chasing butterflies; Mr. Davis said he also had rarely seen such occurrences but more frequently the chasing was done by asilid flies and large dragon flies. Mr. Tee Van, present as a visitor, said that in the examination of 1,000 bird stomachs, remains of moths were plentiful, but only one butterfly was found.

Mr. Cassino, on request, spoke of his Mt. Washington experiences, referring especially to some extraordinary collections of geometers made at night, as on May 25 when he and Mr. Swett had taken 1,200 specimens, including some noctuids; on another occasion above 5th mile post, 125 rare geometers were taken. He said that a 400 c.p. gasoline lamp with mantel was used to illuminate a sheet on these trips; and referred in a general discussion of Mt. Washington to the universal remembrance of Mrs. Slosson's collecting on the summit.

Mr. Weiss exhibited the result of his collecting trips near New Brunswick, N. J., during the past four weeks, principally devoted to a swampy tract of 15 to 25 acres near Monmouth Junction.

Mr. Wm. T. Davis stated that the present spring was from three to four weeks earlier than the usual one. Pear trees were fully in blossom on Staten Island on April 6, and some apple blossoms were open on April 9. Usually apple blossoms do not appear until the first week in May or later. He reported seeing several little blue butterflies (*Lycena pseudargiolus*) on March 28 in the Moravian Cemetery, Staten Island. On the same day many *Pieris rapa* butterflies were also seen. On the warm nights in the latter part of March and first part of April many *Carabus nemoralis* beetles, which have become very numerous on parts of Staten Island, were attracted to the electric lights and some met their death by being stepped on. In a short distance near St. Paul's Ave., Tompkinsville, six of these beneficial beetles were found crushed on the sidewalk.

Mr. Sherman said that 30 to 40 *Carabus nemoralis* were seen under electric lights at Mt. Vernon, N. Y., on the Sunday before Easter.

Mr. J. W. Angell found *Dorcus parallelus* on March 19

Mr. Nicolay gave an account of the trips made with Messrs. Shoemaker and Quirsfeld to Palisades, Wyandanch and Van Cortlandt, where *Cychnus*

*lecontei* and many Pselaphidæ and Scydmenidæ were found. He illustrated on the blackboard the differences in the antennæ of three species of *Brachygluta*, *abdominalis* having the penultimate joint short, quadrate, *luniger*, the last two joints nearly equally elongate, *cavicornis*, both elongate but the penultimate much the longer. It appeared from his records that *cavicornis* was the common species on the Staten Island salt meadow near Decker's pond.

Mr. Notman and Dr. Bequaert also spoke of Pselapid collecting under bark and in damp woods.

In a general discussion of the early spring it developed from many instances cited by Messrs. Woodruff, Burns (*Papilio turnus* flying April 12th), Davis (*Cicindela rugifrons* April 3d), Shoemaker, Bischoff, Dr. Lutz, Angell, Watson, Nicolay, Weiss and others, that while the season for plants and overwintering insects was certainly early, there were probably other insects that failed to respond to the impulse of the warm days in March, as shown by the poor collecting at Pussy Willow this year. Dr. Bequaert objected, however, to any conclusions being drawn regarding insects without the same carefully compiled comparative data that Mr. Davis used regarding plants.

Mr. Tee Van spoke briefly of his collecting in the South American rain forest with Prof. Wheeler and Dr. Forbes and the intensive work done in a limited area.

Dr. Bequaert announced the repetition in Brooklyn of Dr. Bradley's lecture on Upper Amazon country, praising it as given in the Staten Island Museum.

Mr. Cassino closed the meeting by an interesting account of his early entomological experiences with Putnam and Packard, his drawings of Geometrid venation, his 22 editions of the Naturalist's Directory, his connection with the American Naturalist, etc.



# THE NEW YORK ENTOMOLOGICAL SOCIETY

Organized June 29, 1892.—Incorporated June 7, 1893.

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The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

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OF THE

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Published quarterly by the Society, at 41 North Queen St., Lancaster Pa., and New York City. All communications relating to the JOURNAL should be sent to the Publication Committee, New York Entomological Society, American Museum of Natural History, New York City; all subscriptions to the Treasurer, Wm. T. Davis, 146 Stuyvesant Place, New Brighton, Staten Is., New York, and all books and pamphlets to the Librarian, Frank E. Watson, American Museum of Natural History, New York City. Terms for subscription, \$2.00 per year, strictly in advance. *Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY*

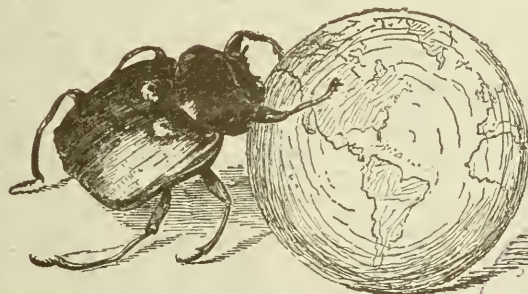
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JOURNAL  
OF THE  
NEW YORK  
Entomological Society.

Devoted to Entomology in General.



JUNE, 1922.

Edited by HOWARD NOTMAN

*Publication Committee.*

HOWARD NOTMAN.

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CHARLES SCHAEFFER

Published Quarterly by the Society.

LANCASTER, PA.

NEW YORK CITY.

1922.

[Entered April 21, 1904, at Lancaster, Pa., as second-class matter under Act of Congress of July 16, 1894.]

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# JOURNAL

OF THE

## New York Entomological Society.

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VOL. XXX.

JUNE, 1922.

No. 2

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### BIOLOGY OF THE GOLDENROD GALL-MAKER GNORIMOSCHEMA GALLÆSOLIDAGINIS RILEY.<sup>1</sup>

By R. W. LEIBY, PH.D..

RALEIGH, N. C.

#### INTRODUCTION.

While engaged during the past seven years in tracing the polyembryonic development of a hymenopterous parasite *Copidosoma gelechiæ* How., the writer has of necessity followed through several of these years the life-history of its host *Gnorimoschema gallæsolidaginis* Riley, the maker of an elliptical gall on the stems of goldenrod. This study has revealed several striking points in the biology of an insect whose gall has long been familiar to many naturalists. Certain seasonal data have also been secured in the widely separated States of Vermont, New York, and North Carolina, which indicate quite an interesting variation in the time of appearance and length of the different stages in the regions mentioned.

#### HISTORY AND DISTRIBUTION.

The maker of the elliptical gall of the goldenrod is the larva of a moth belonging to the family Gelechiidæ. It was described by C. V. Riley<sup>2</sup> in 1869 from specimens bred in Missouri and named *Gelechia gallæsolidaginis*, and at this time Riley also published some notes

<sup>1</sup> Contribution from the entomological laboratories of Cornell University and Experiment Station of the North Carolina Department of Agriculture.

<sup>2</sup> Riley, C. V., Mo. Rept. State Entomologist Nox. Insects, 1. 1869, p. 173.

on the larva and its gall. Busck<sup>1</sup> in 1900 placed the species in a new genus *Gnorimoschema* and called *gallæsolidaginis* the type. Since then the species has been rather frequently referred to by naturalists so that its distribution is known to include the States of Colorado, Missouri, Minnesota, Michigan, Vermont, Massachusetts, Connecticut, New York, Pennsylvania, New Jersey, Maryland, District of Columbia, Virginia and North Carolina, and will probably be found to occur in the neighboring states. The life-history is therefore known in a general way although the few references concerned contain some conflicting statements particularly regarding the adult and its habits.

The life-history of a closely related species *Gnorimoschema salinaris* Busck has more recently (1915) been reviewed by Prof. J. T. Patterson.<sup>2</sup> The larva of this species forms a similar gall on *Solidago sempervirens* whereas *G. gallæsolidaginis* has been found by the writer to breed in the stems of the *Solidago canadensis*, *serotina*, and *nemoralis*. There are points in the life-history and appearance of the galls of the two species which differ noticeably, but the adults are very difficult to distinguish.

#### LIFE-HISTORY SUMMARY.

The insect is single brooded. The fully formed oblong or elliptically shaped gall (Plate VIII, Fig. 3) is to be found from the latter part of July<sup>3</sup> on through the winter. If the galls be cut open early in July a uniformly dark colored larva with darker patches on the thorax and abdomen will usually be found in the chamber (Plate VIII, Fig. 4). The larva becomes fully grown during the latter part of July or early in August at which time it measures about 17 mm. in length. Its food for growth has been obtained by gnawing at the stem of the goldenrod from the inside, which action doubtless causes the rod to bulge outward at the feeding place and the gall to be thus formed.

<sup>1</sup> Busck, August, New Species of Moths of the Superfamily Tineina from Florida, Proc. U. S. Nat. Museum, Vol. 23, 1900, p. 227.

<sup>2</sup> Observations on the Development of *Copidosoma gelechiæ*, Biological Bulletin, Vol. 29, No. 6, December, 1915.

<sup>3</sup> All dates unless otherwise specified are for Ithaca, N. Y., conditions. Variations in the time of appearance of different stages in different regions are referred to later.



Following the making of the exit hole in the wall of the gall at the anterior end so that the adult may readily emerge, the larva pupates. This takes place about August 5. The dark wine colored pupa (Plate VIII, Fig. 6) measures about 12 mm. in length. It is always found head up in the gall chamber. The pupal stage covers a period of about thirty-six days (51 days in North Carolina).

The adults (Plate VIII, Fig. 7) emerge from the galls through the previously prepared exit holes during the last part of August and early September. After mating the eggs are deposited singly on the stems and lower dried leaves of the goldenrod. Oviposition begins within a few days after mating and extends over a period of two weeks. The adults live about three weeks.

The insect hibernates in the egg stage, with the eggs remaining on the rods and leaves in some instances; but usually the leaves bearing the eggs may drop to the ground; likewise the stems may fall over, so that many of the eggs may pass the winter on the ground more or less protected by various leaves and other vegetation.

Completely formed larvæ are developed within the eggs during the fall but they do not emerge until late in May of the following spring. The time of hatching varies considerably in the same locality from year to year, but it occurs regularly at the time when the new goldenrod shoots are four to six inches high.

The young and minute larva upon emerging from the egg crawls rather aimlessly about until it comes in contact with a new goldenrod shoot whereupon it crawls up the stem to the unfolding bud. It is obvious that the mortality at this time would be abnormally high as the young larvæ would frequently fail to locate a new goldenrod shoot were it not for the fact that the shoots grow directly from the old root stock. The place of hatching of the egg is therefore close to a new shoot, hence comparatively little difficulty is encountered by the larva in finding a new shoot in which to make its home.

When the larva reaches the bud end of a new rod it bores into the bud entering it from the side. Here it takes its first meal and proceeds to eat its way a short distance (one to two inches) down the center of the rod, where it remains. Feeding is continued on the inside and this, coincidentally with the growth of the rod, causes the formation of the typical gall, the chamber of which is the home

of the larva. Here the larva remains until fully grown, the gall meanwhile increasing in size until by the latter part of July the larva is mature; the rods have usually ceased growing; and the gall measures from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches in length depending upon the species of *Solidago* upon which it is found.

#### DESCRIPTION.

*The Adult:* The two sexes are not strongly dimorphic, but they may be distinguished by their size and activity when confined in cages. The female measures 23 mm. from tip to tip of wing while the male measures only 20 mm. The forewings are dark, the anterior middle part being a reddish brown while the base and tip of the forewing shades from brown to gray. The hind wings are considerably lighter but ashy-gray in general color.

When the wings are folded their tips flare upward and the moths strongly resemble an upturned boat of which the dorsal ridge of the wings represents the keel. The wings extend slightly beyond the abdomen. The males average 10.5 mm. in length from head to tip of wings and the females 12 mm.

*The Egg:* The egg (Fig. 1) is more or less cylindrical but rounded at both ends and measures .3 mm. by .8 mm. in size. The chorion is delicately sculptured with numerous ridges which gives its surface the appearance of being composed of numerous delicately sunken polygonal areas. When first deposited the egg is creamy-white in color, but with the development of the embryo its color turns to yellow and finally a pale orange. During winter when the embryo is completely developed the chorion appears slightly shriveled. The writer has had occasion to section numerous eggs and has found the chorion to be tougher than that of the average lepidopterous egg.

*The Larva:* The newly hatched larva measures about 1.3 mm. in length and .3 mm. in width. At first it is pale green with a dark brown head and pronotal shield, but soon after commencing to feed the general color becomes brown. This uniform brown color is maintained throughout its period of growth although as it becomes full grown, four minute darker pigmented tubercles, which are arranged in the form of a trapezoid, are to be observed on each segment (Plate VIII, Fig. 5).

The first moult takes place while the young larva is secluded in the terminal bud of the goldenrod shoot and the succeeding moults (five altogether) are undergone in the gall chamber, since the larva never abandons the gall. During growth it was observed that the excrement is packed in the apex and base of the gall but mostly in the base (Plate VIII, Figs. 4, 6 and 8), the chamber always being scrupulously clean. This detritus was carefully examined for the moult skins upon a number of occasions and four head capsules representing four additional instars were always found. The last moult skin is always found either in the base of the gall chamber or adhering to the pupa (Plate VIII, Fig. 6).

The length of the instars was determined by measuring the size of the head capsules and comparing them with the size of the heads of a large number of larvæ during June and July, and further comparing them with the length of the larvæ. This data is given in Table I and indicates that the length of the instars averages 8, 8, 9, 15 and 24 days respectively although the last instar includes a semiquiescent prepupal period of about a week during which time the larva shrinks perceptibly in size. No descriptions of the instars are given since all stages are uniformly colored, a condition to be rather expected since the larva spends the last four instars of its life in complete darkness.

TABLE I. NUMBER AND LENGTH OF LARVAL INSTARS—SEASON 1914.

Instars.	Length of Larva.	Width of Head.	Average Date of Observation.	Number Specimens.
First.....	1.3 mm.	.3 mm.	May 30	12
Second.....	5.0 mm.	.4 mm.	June 8	38
Third.....	7.0 mm.	.6 mm.	June 16	46
Fourth.....	10 to 14 mm.	1.2 mm.	June 25	49
Fifth.....	16 to 13 mm.	1.4 mm.	July 10	41

*The Pupa:* The pupa averages 9.5 mm. in length. It is shiny mahogany brown in color which changes to an almost jet black (Fig. 6) just before the adult emerges. It shows no striking characteristics in which it might differ from the usual lepidopterous naked pupa.

#### BIOLOGY AND HABITS.

The writer has had occasion to follow the complete life-history of this gall-maker during several years and to rear the insect from the

egg to adult stage. In order to do this successfully it was first essential to observe the biology and habits of the insect very closely in its various stages. These observations proved not only interesting but will throw considerable light upon conflicting statements in literature relative to the biology of the adult.

As has been pointed out briefly above—the adult appears in late summer or early fall, deposits its eggs and then dies. The insect hibernates in the egg stage. The eggs hatch about May 16, the larvæ crawling to the new goldenrod shoots and developing in galls.

Concerning the adult, Riley (1869) says that “the moths winter over” and not the eggs, “and may be seen flying in the month of May in which month I have myself captured a specimen. When the young plants of the goldenrod are about six inches high the female moth deposits an egg in the terminal bud, or at the side of the stalk just below it, and the worm hatching from the egg works into the stalk and causes it to swell by gnawing and thus inducing the secretions towards it.”

Perhaps on the basis of Riley's observations, Patterson (1915) thought that the adults of *Gnorimoschema salinaris* must deposit their eggs normally in the spring. Speaking of the parasite *Copidosoma gelechiæ* Patterson says “the parasites must winter over in the imago state; otherwise they would not be able to parasitize the normal or spring eggs of *Gnorimoschema*.” On the other hand Patterson did secure some eggs in fall from *salinaris* moths which were confined in cages, which he was inclined to believe developed parthogenetically although the moths were confined with males. He further makes the statement that “*G. gallæsolidaginis* from the galls of *S. canadensis* in western Ohio likewise drops several eggs soon after emerging from the pupa in September.” Patterson questioned the development of the fall eggs of this species into larvæ under normal conditions, solely because of difficulties the young larvæ would have in withstanding the winter or in finding a new shoot of the goldenrod in spring.

The writer has never encountered any difficulty in securing eggs from adults of *gallæsolidaginis* in fall. Moths have been caged time after time in glass cylinders with cheese cloth top with living goldenrod stems, and in large outdoor cages 5 x 5 x 4 feet in size built over clumps of goldenrod. In this way thousands of eggs have been secured at will.

*Emergence, Mating and Oviposition of Moths:* The moths emerge from the galls at night through their previously prepared exit holes. In some instances moths for some reason or other, probably because of an improperly prepared exit hole, are unable to escape from the galls.

Female moths begin to deposit eggs within four or five days after emergence when they have been previously confined with males. The eggs are deposited singly, although two or three may be placed close together and perhaps mass-like in actual contact with each other. These are placed on both surfaces of a leaf but usually on the under side and preferably on one that is dried; and on the stems among the hairs. During oviposition which occurs at night the female is very active, flitting about in cages, crawling up the stem, or jumping from one leaf to another. The placing of an egg requires from eight to ten seconds and during the process, two segments of the abdomen ordinarily hidden are extruded, and the egg emerges from the tip; meanwhile the moth frequently twists or swings the tip of the abdomen from side to side in search of a crevice, such as the point of attachment of a leaf to a stem, or the vein of a leaf, and, finding such a crevice or place against which the abdomen may rest for an instant, the egg is deposited. As the egg is extruded it appears wet and glistening with a secretion which probably serves to fasten it to the leaf or stem. The moth may fly away, adjust its position only slightly, or merely move the tip of the abdomen before depositing another egg. An average of about sixty eggs is deposited by one female although one moth deposited a total of ninety-six eggs in an outdoor cheesecloth cage over a period of seven nights.

During the day the moths rest secluded, apparently hidden by their color resemblance to the dried leaves of the goldenrod, within the curled leaves or among the florets. When disturbed they quickly attempt to seclude themselves, and do not fly about for any length of time.

Moths have been observed to partake of nourishment in the form of sweetened water when placed in indoor cages. It may be this factor which causes females to deposit a greater average number of eggs in indoor cages than under the semi-natural conditions of outdoor cages.



Eggs have been commonly and regularly found in fall under natural field conditions so that there is no doubt but that oviposition in fall is normal for this species.<sup>1</sup> In order to secure further evidence, however, certain experiments in burning over small areas of goldenrod in fall were carried out with a view to determine whether galls would develop upon the new shoots in spring in the burned-over areas. This was done in two seasons (during November) and resulted in the burning of the old goldenrod stems and leaves in restricted areas which had been abundantly infested with galls that year. The new shoots which grew in the burned-over areas did not develop galls the following spring, while the new shoots of adjacent areas not burned over did develop galls. These experiments may be commonly substantiated on a large scale in North Carolina where fires sweep through woods and about their edges. Goldenrod shoots growing out the following spring are inevitably free of galls in the burned-over areas if the burning has been thorough. Moreover, it is further apparent that spring overflows or freshets of streams prevent the eggs in the territory covered by the freshet from hatching, by drowning the young larvæ in the eggs or perhaps by covering them with mud. The writer has had occasion to observe during summer after an overflow in spring, that goldenrod in the area not covered by the freshet was infested with galls while the flooded area showed the goldenrod free of galls; the line of high water was identical with an imaginary line between the gall-free and infested areas of goldenrod.

*Embryonic Development:* Immediately after deposition the eggs begin to develop. Under Ithaca, N. Y., conditions this requires about 26 days while in North Carolina the period is lengthened to about 35 days. The overwintering egg therefore contains a fully formed larva partially coiled within the egg shell.

The question of parthenogenesis in *Gnorimoschema* has been raised by Patterson who figures<sup>2</sup> a section of an egg of *salinaris* which he states was deposited by a female not associated at any time with males. Apropos of this, some of the writer's experiments along this line with *gallæsolidaginis* may be of interest. Unfertilized females were upon several occasions separately caged, and frequently they

<sup>1</sup> This is certainly the time for the species in Vermont, New York and North Carolina.

<sup>2</sup> *Loc. cit.*



have deposited or dropped some eggs; but these developed only partially and never any semblance of an embryo. Moreover such eggs were always deposited eight or nine days after those of a similarly aged but fertilized female. Unfertilized eggs are therefore probably dropped only abnormally, and parthenogenesis in *gallasolidaginis* does not occur.

*Hatching of Eggs:* According to records of three years the eggs hatch in North Carolina between March 22 and April 5. The hatching date for New York has not been secured but when an early instar under North Carolina conditions is compared with a similar instar in New York, it can readily be determined that the eggs must hatch in New York around May 16.

The first determination of the time of hatching of the eggs followed the failure of three successive winters in attempts to keep them through the winter under semi-natural conditions. During the fourth winter of experiment, eggs<sup>1</sup> deposited regularly on dried leaves and stems of goldenrod in fall were carried through by placing these leaves and parts of stems in small shell-vials stoppered loosely at both ends with cotton; the vials were in turn placed in larger vials similarly stoppered. This method solved the problem of continued excessive moisture previously encountered. The eggs hatched normally, the larvæ producing galls which were visible on the new goldenrod shoots at the same time that the galls of a similar size were visible in the field. In the two following years the date of hatching in vials was again closely compared with the time of hatching in the field, and the dates found to accord.

*Growth and Habits of Larvæ:* The process of hatching and location of a new goldenrod shoot by the young larva has been watched continuously for as much as six hours at a time. The young larva which measures but 1.3 mm. in length seems to crawl aimlessly about on blades of grass or over earth, and the watching of them in the hopes they will find a goldenrod shoot is at times most exasperating. But once the larva comes in contact with a goldenrod shoot, which at this time is four to five inches in height, it proceeds to crawl up the shoot to the bud end, crawl about on the tender leaflets for a little

<sup>1</sup> These eggs had been oviposited in by the polyembryonic parasite *Copidosoma gelechiæ* and it was primarily intended to keep these particular eggs for rearing of the larvæ in spring.

while and finally eats its way into the bud from the side. It remains in the bud for five to seven days where it feeds (and undergoes its first moult), during which time its presence may be externally detected by the finding of its excrement among the leaves of the bud; and then burrows its way down the center of the stem. The leaves which compose the bud while the larva is within show signs of the feeding of the larva when they grow out, some having irregularly frayed edges while others are full of small holes.

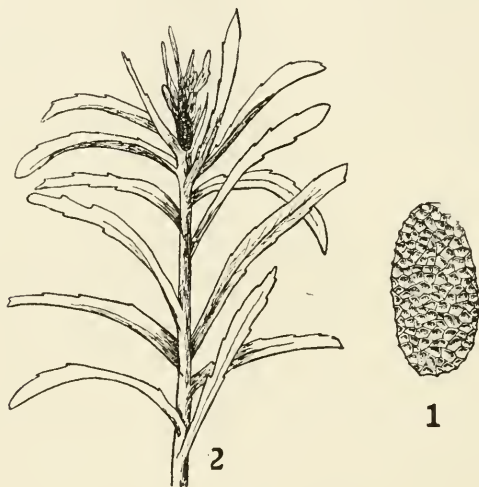


Fig. 1.—Egg.  $\times 28$ .

Fig. 2.—Small gall beginning to form just below the bud of goldenrod shoot.

The second stage larva eats its way down the stem for a distance of two to three inches. This distance determines the comparative position of the gall on the rod when fully grown. Here it remains and within a few days, after it has fed at one point by gnawing on the interior of the stem, the gall begins to develop (Fig. 2). The continued feeding doubtless causes a stimulation of the plant tissues in the vicinity of the larva, for the gall increases to a size on each species of *Solidago* proportionate to the amount of feeding done by the larva. Thus when the larva dies within the gall before becoming fully grown (this happens frequently because of parasites), it has been observed that the growth in size of the gall also ceases. Occasionally two larvæ

happen to enter the bud of the same stem and two galls are thereupon produced on such a rod.

After the larva has fed for ten days or so in the gall, it packs the accumulated excrement mixed with a little silk in the apex of the chamber and thus seals its entrance passageway. Subsequent excrement is similarly packed in the base of the gall chamber, the inside being always kept scrupulously clean.

When the larva is about three fourths grown it begins to eat a small channel toward the outside of the gall at the anterior end (Plate VIII, Figs. 4 and 6) which is continued until the very outside layer of the stem is reached. Later the outside layer is cut and used, together with silk secreted by the larva, to form a peculiar circular plug (Plate VIII, Fig. 3) measuring 2 mm. in diameter and 1.6 mm. thick, which is so constructed and placed that it can readily be pushed outward from within but not inward from without. This serves as an exit hole for the adult.

The larva ceases to feed to any extent about July 20 at which time it measures around 14 mm. in length. For a period of a week to ten days it lies semiquiescent within the gall, but during this time it cleans out the gall thoroughly, packing all excrement in the base, and then lines the gall with a thin layer of silk. Following this it pupates, the last larval skin sometimes remaining attached to the caudal end of the pupa (Plate VIII, Fig. 6).

The pupal stage covers a period of about one month at Ithaca, N. Y. (August 5 to September 10).

The moth upon emerging from the pupal shell crawls to the apex of the gall, and remains there until the wings are completely developed and dried. It then approaches the plug of the exit hole, exudes a drop of secretion which allows the plug to be readily pushed aside, and emerges from the gall.

*Seasonal Occurrence:* The writer has been privileged to determine the time of appearance of the various stages in three widely separated regions, viz., Williamsville, Vermont,<sup>1</sup> Ithaca, New York, and Raleigh, North Carolina. The insect is single brooded in each region and

<sup>1</sup> Many thanks and appreciation are due Mr. S. A. Merrifield, of Williamsville, Vermont, who frequently sent me galls of this species and made some biological observations in this locality which have been used in this paper.

there is a very close correlation between the development of the insect and its host plant, the goldenrod.\*

The time of hatching of eggs occurs in each region when the goldenrod shoots are four to six inches high. This as seen in Table II begins as early as March 26 in North Carolina and probably occurs gradually later as one moves northward, until as far north and east as Vermont, the average date of hatching is as late as May 20. The length of the larval stage extends over 150 days in North Carolina, 81 days in New York and 71 days in Vermont. Similarly the pupal stage is longer in the "warmer" regions, being increased from 24 days in Vermont to 51 days in North Carolina. We thus see that the activity of the larvæ in Vermont begins late (May 20) and ends early (August 23), covering a period of 95 days; at Ithaca, N. Y., it begins slightly earlier (May 16) than in Vermont and ends slightly later (Sept. 10), covering a period of 117 days; while in North Carolina hatching is much earlier (March 26) and emergence much later (October 13), covering a period of 221 days. This not only holds true for this insect but for at least one of its primary parasites, *Copidosoma gelechiæ*, as well.

These data are in a measure an exception to the theory often applied to insects, that the warmer the climate the more rapid the growth and the greater the number of generations.

TABLE II. APPEARANCE OF STAGES AND THEIR LENGTH IN VARIOUS REGIONS.

Region.	Date of Hatching of Eggs.	Length of Larval Stage.	Date of Maximum Pupation.	Length of Pupal Stage.	Date of Maximum Emergence.
Williamsville, Vt.....	May 20	71 days	July 30	24 days	Aug. 23
Ithaca, N. Y.....	May 16	81 days	Aug. 5	36 days	Sept. 10
Raleigh, N. C.....	Apr. 3	150 days	Aug. 23	51 days	Oct. 13

#### PARASITES.

An exceptionally high percentage of the individuals of all stages is attacked by hymenopterous parasites and their detailed study would afford a fascinating problem. Hyper-parasites and inquilines are also commonly bred from the galls. In two instances two species of parasites (*Copidosoma gelechiæ* and *Scambus pterelas*) were reared from a single larva.

The writer has devoted considerable attention to the study of some of these parasites, particularly the biology and development of the polyembryonic parasite *Copidosoma gelechia*.<sup>1</sup> Only brief references will be made here to the species<sup>2</sup> bred.

*Eurytoma* sp. (probably *bolteri* Riley): An external parasite of the larva whose egg is either placed on the host larva or deposited in the gall chamber and eventually coming in contact with the host. Some of the parasite larvæ pupate in late summer and produce adults which emerge from the galls while other larvæ remain naked in the gall over winter and produce adults the following spring. Common at Ithaca, N. Y., present in Vermont and North Carolina.

*Pleurotopis* sp.: Parasite of *Eurytoma* sp. with a life-history similar to that of its host. Five to twelve larvæ commonly attack one host larva. Ithaca, N. Y., and Vermont.

*Copidosoma gelechia* How.: This primary parasite deposits its egg in the host egg. The host larva develops normally until just before pupation when it dies. An average of around 165 individuals of the parasite are developed in one larva from one parasite egg. The parasites pupate in the host carcass about August 10, emerge as adults nearly a month later and then escape from the gall. Common at Ithaca, N. Y., Williamsville, Vermont, and fairly common in North Carolina.

*Calliephialtes notanda* Cress.: Parasite develops in larva devouring it so that it does not pupate. Larva pupates in the gall in elongate brown cocoon made of tough silk, from which the adult emerges in late summer. Very common in North Carolina, present at Ithaca, N. Y.

*Scambus pterelas* Say: Parasite larva destroys the host larva and pupates naked in gall chamber. Adult emerges from gall Aug. 12-24. Bred fairly common at Ithaca, N. Y.

*Phaeogenes gelechia* Ash.: Emerges from host pupa and then from gall. Common at Ithaca, N. Y.

*Campoplex dimidiatus* Cress.: Adult emerges from tough brown white banded cocoon spun inside gall chamber. Overwinters in cocoon and adult emerges late March. Ithaca, N. Y. (rare).

<sup>1</sup> To be issued in December 1922 number of the Journal of Morphology.

<sup>2</sup> The parasites were determined by Messrs. A. B. Gahan and S. A. Rowher of the U. S. Nat. Museum through the kindness of Dr. L. O. Howard and in part by the writer.

*Microgaster gelechiæ* Riley: Adult emerges from gall and white silken cocoon within in spring. Common in North Carolina and present at Ithaca, N. Y.

At least two other species of parasites have been reared but not as yet determined. One species is a gregarious braconid, the other is probably *Pseudacrias sexdentatus* Girault.

#### EXPLANATION OF PLATE VIII.

FIG. 3. Two fully grown galls. Plug pushed out to allow the escape of moth in the right gall revealing the exit hole while the gall to the left shows the plug in place. Natural size.

FIG. 4. Nearly grown larva in gall cut open. Note passageway leading to exit hole at apex of the gall on the left, and excrement packed in base of gall chamber. Natural size.

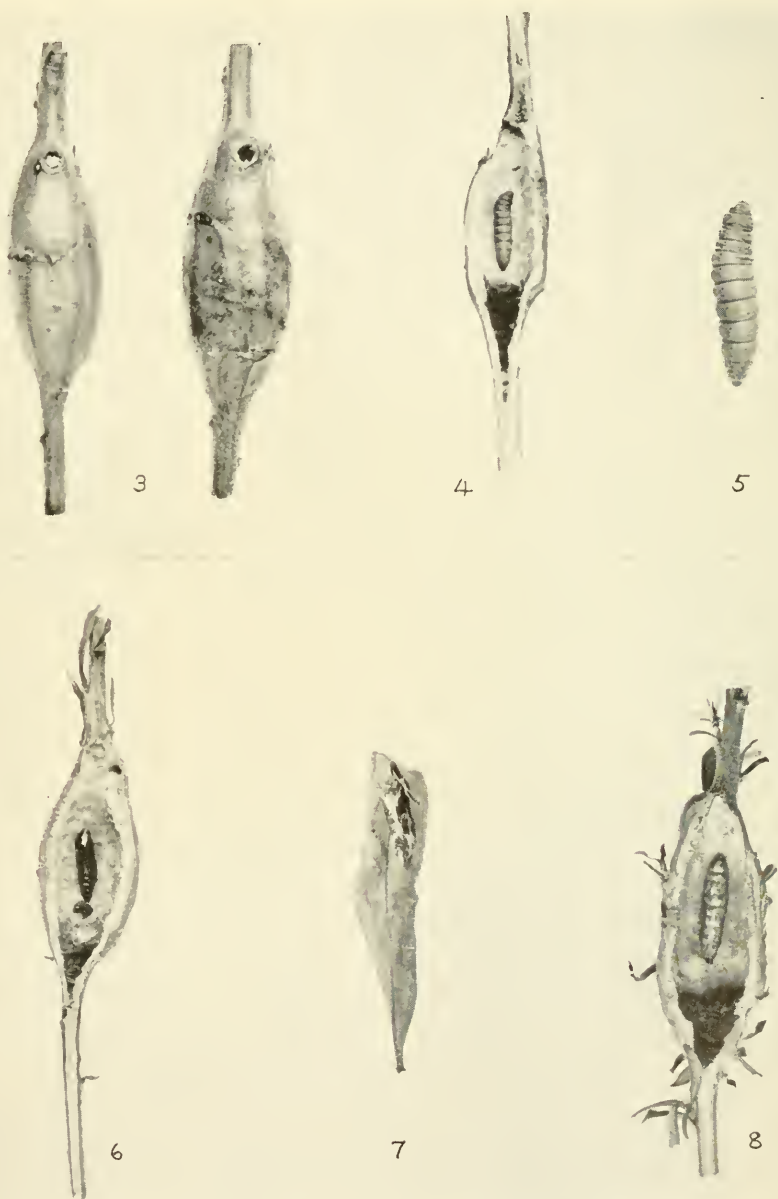
FIG. 5. Full grown larva.  $\times 2.5$ .

FIG. 6. Pupa in gallchamber. Natural size.

FIG. 7. Adult on goldenrod leaf. Natural size.

FIG. 8. Larva parasitized by *Copidosoma gelechiæ* in gall chamber.





GNORIMOSCHEMA.



## NOTES ON THE RHYNCHOPHORA OF EASTERN NORTH AMERICA, WITH CHARACTERIZATIONS OF NEW GENERA AND DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY,

INDIANAPOLIS, IND.

In order that our knowledge of the Rhynchophora of Eastern North America (exclusive of the Scolytidæ) may be kept somewhat up to date I hope to prepare, from time to time, articles describing any new species which may come to hand and mentioning those described by others. I will also include notes referring to the extension of the known range and any new knowledge of the food habits which may be gained of those species treated in the "Rhynchophora of Northeastern America," issued in 1916 by Chas. W. Leng and myself. This is the second of two articles which have been prepared supplementary to that work, the first appearing in this Journal in 1920.<sup>1</sup>

Since the first article was prepared I have each season collected extensively in Indiana during the summer and autumn months and in southern and southwestern Florida during those of winter and early spring, my work in the latter State having extended as far down as Chokoloskee, the most southern settlement on the West Coast. Numerous specimens have also been received, either in exchange or for determination, from many collectors in the region covered. Among those at hand, either taken by myself or received from others, are a number of species not treated in the "Rhynchophora." A few of these are forms then believed to be extralimital to the area covered in that work. The others are species believed to be hitherto undescribed and some of them evidently not belonging to any genus characterized in the "Rhynchophora." I have therefore, in this paper, described as new 14 species and founded three new genera. No one of the species described is based upon color characters alone, all possessing differences in structure which distinguish them strongly from their nearest allies.

<sup>1</sup> Some New Rhynchophora from Eastern North America with Additions to and Corrections of the "Rhynchophora of Northeastern America," JOURN. N. YORK ENTOM. SOC., XXVIII, No. 2, June, 1920, pp. 161-178.

Since my first supplementary paper, cited above, appeared, Leng's "Catalogue of the Coleoptera of America North of Mexico," and Casey's "Some Descriptive Studies among the American Barinae," have been issued. Most changes in these two works of the nomenclature in the Rhynchophora, relating to the species which are mentioned in this paper, have been adopted. The order of treatment and the serial number before each species are, however, those of the Rhynchophora. Where a species is placed under a new generic name by either Leng or Casey, the old name in parenthesis follows the new.

11. *Toxotropis floridanus* Leng.

One specimen was taken at Lakeland, Fla., March 2. Known heretofore only from Enterprise, and Dunedin, that State.

12. *Eusphyrus walshi* Lec.

This little Anthribid<sup>1</sup> resembles so closely some of our species of *Brachytarsus* that it is often confused in collections with them. In fact, it is now my opinion that the genus, if distinct from *Brachytarsus*, should be placed near it in the Anthribini and not with the Tropiderini, with which it is less closely allied. In *walshi* the transverse ridge is as near the base of thorax as in any species of *Brachytarsus*. The only salient distinctions between the two genera are that the beak is wider and less tapering in *Eusphyrus* and the hind angles of thorax project a little more beyond the humeri. The color of the legs is variable in *walshi*, the femora in some examples being piceous and the tibiae pale only at base. The beetle is scarce both in Indiana and Florida, but four specimens having been taken in all my collecting in Indiana, while my single example taken at Ormond, Fla., is, as far as known, the only one recorded from that State.

16. *Tropideres rectus* Lec.

Two specimens were taken at Chokoloskee, Fla., March 16, by beating dead vines. Hitherto known in that State only on or near the east coast.

<sup>1</sup> Leng in the body of his recent Catalogue has adopted the name Platystomidae, proposed by Pierce in 1916, for the long used family name Anthribidae, but in his preface and chart uses the old name, which is much to be preferred.

**Allandrus brevicornis** Frost, Can. Ent., LII, 1920, 252.

This little weevil was described from specimens taken at Framingham, Mass., Monmouth, Maine, and Edmonton, Alberta. A specimen at hand, received from F. S. Carr of Edmonton, shows that it is very distinct from *bifasciatus* Lec., in the characters mentioned by Frost. It occurs on the dead branches of willow.

18. **Phenicobiella chamæropis** Lec.

In recent years I have taken this species in numbers at Dunedin, Ft. Myers and Everglade, Fla., in company with the Cucujid *Hemipeplus marginipennis* (Lec.) and the large Bruchid *Caryoborus gleditsiae* (L.). All three occur on the dead leaves of the cabbage palmetto, *Sabal palmetto* (Walt.), and are the most common beetles to be found on that plant.

**Piezocorynus virginicus** Leng, Journ. N. Y. Ent. Soc., XXVI, 1918, 11.

A species allied to *P. dispar* Gyll., but lacking the thoracic elevations of that species and having the yellow pubescence of elytra concentrated on the sides instead of on the disk. Described from 19 specimens taken July 12 from a recently killed black oak near Wingina, Va.

20. **Piezocorynus mixtus** Lec.

Two specimens have been taken at Dunedin, one by sweeping low shrubs on December 1, the other at porch light on March 28. Schwarz, in his Florida List, records it as rare at Enterprise and Tampa, and in his Ms. notes from St. Augustine, these being the only definite records from the State.

26. **Euparius lugubris** Oliv.

This, our most handsome Anthribid, was not taken by me in Florida until March, 1921, when a dozen or more were found at Dunedin in a white woody fungus on an oak log. Schwarz mentions it as rare at Enterprise and, in his notes, from St. Augustine.

29. **Brachytarsus tomentosus** (Say).

In addition to the Indiana locality mentioned in the Rhynchophora may be given Marion, Putnam and Crawford counties, in all of which it has been recently taken in June or August by sweeping.

30. *Brachytarsus paululus* Casey.

Taken in recent years in Knox, Crawford and Posey counties, Ind., by sweeping lowland herbage.

41. *Euxenus piceus* Lec.

Three specimens were taken singly at Chokoloskee, Fla., March 12-15, while beating along the edge of a mangrove swamp close to the beach.

*Auletes minor* new species.

Oblong-oval. Fuscous brown, feebly bronzed, very thinly clothed with fine white pubescence, this somewhat condensed along sides of elytra and in a cross band at their apical fourth; base of femora, tibiae, tarsi and last ventral paler; antennae dull yellow, the club piceous. Beak about as long as thorax, but slightly enlarged near tip, finely carinate, minutely and very sparsely punctate, the antennae inserted at basal fourth. Head, including eyes, slightly wider than thorax, finely and sparsely punctate. Thorax subcylindrical, as long or slightly longer than broad, widest at middle, rather coarsely and thickly punctate. Elytra oval, one third wider at base than thorax, the punctures of disk fine, somewhat confused at middle and evanescent towards apex. Abdomen minutely and sparsely punctate. Length 1.2 mm.

One specimen taken March 8, by sweeping low herbage near the beach at Caxambus, Fla. Much smaller, less pubescent and with beak relatively shorter and thorax more coarsely punctate than in our other eastern species.

49. *Eugnamptus puncticeps* Lec.

One specimen in the Wolcott collection taken at Hessville, Lake Co., Ind., July 2. The first record for the State.

*Tachygonus minutus* Blatch.<sup>1</sup>

This species was described from a single male taken April 19 by sweeping ferns in a dense moist hammock near Dunedin, Fla. It is but 1.3 mm. in length, black, shining, with legs and antennae wholly testaceous and a small white tuft of hairs on each hind angle of thorax and another near middle of elytral suture.

*Tachygonus fulvipes nigrescens* new variety.

Black; antennae, tip of beak, fore and middle tibiae and tarsi reddish-brown, hind legs wholly black; erect hairs dark brown. Otherwise agrees with the original description of *fulvipes* Lec.

<sup>1</sup> Can. Ent., LII, 1920, 263.



A single specimen in the Wolcott collection taken June 13, 1909, at Willow Springs, Ill. LeConte's unique type of *fulvipes* was described from that State without definite locality. It is possible that *nigrescens* may prove to be the *T. centralis* Lec., described from New Mexico.

**Apion punctinasum** Smith, Trans. Amer. Ent. Soc., XI, 1884, 46.

Two specimens of this well-marked species were taken this season in Marion Co., Ind., one June 22, the other August 15, both being swept from low herbage in a dense woodland near Broad Ripple. It was not included in the Rhynchophora as it has previously been known only from the Northwest, ranging from Dakota and British Columbia to Wyoming and Nevada. Identified for me by Mr. Fall, who wrote that among New Jersey material recently received from Bischoff, he had found a specimen also very close to *punctinasum*. From all other eastern Apionids *punctinasum* may be known by its short, stout, densely punctate beak and by having three conspicuous patches of white pubescence on the elytra, one on the base of each of the third intervals, the other just behind the scutellum. Belongs in Group II of the Rhynchophora, following *reclusum* in the key on p. 73.

71. **Apion finitimum** Fall.

This species was taken in numbers July 14, while sweeping about the borders of a wet-weather pond near Broad Ripple, Marion Co., Ind. The first record for the State, Fall's types being from Massachusetts, District of Columbia and Michigan.

115. **Apion lividum** Smith.

About Dunedin this little pale reddish-brown Apion occurs in numbers in early winter on the foliage and flowers of the climbing hempweed, *Willughbea scandens* (L.). It is probable that a close examination of this plant, which ranges from Indiana and Ontario to Florida and Texas, will disclose that the weevil occurs in a number of the southern States, it being so far known only from Florida.

**Apion hibisci** Fall, Journ. N. Y. Ent. Soc., XXVI, 1918, 219.

This addition to our eastern species of Apion is so far known only from New Jersey, where it occurs in numbers, breeding in galls on the swamp rose mallow, *Hibiscus moscheutos* L. Specimens are at hand

taken by E. A. Bischoff at Arlington. Fall, in his notes following the description, states that it "belongs to Section IV of his Synopsis.<sup>1</sup> (Group IV of the Rhynchophora) and would by the table fall near *attenuatum*, after which it may best be placed; differing by its stouter form, broader thorax, more parallel elytra, more basally inserted antennæ and paler tibiæ and tarsi."

129. *Barynotus schoenherri* Zett.

The records of this species from Wales, Me., and Framingham, Mass., furnished us by C. A. Frost, are erroneous, specimens of *Panscopus erinaceus* having been wrongly determined as the *Barynotus* by Frost.<sup>2</sup>

*Hyperodes latinasus* new species.

Elongate-oblong, robust. Dark chestnut-brown, the apical fifth of thorax, apical fourth of elytra, antennæ, tibiæ and tarsi a paler reddish-brown. Beak scarcely as long as thorax, nearly as broad as head, subdepressed and strongly tricarinate above, the coarse punctures between the carinæ each bearing an erect brownish bristle. Head coarsely and closely punctate, each puncture enclosing a minute prostrate yellow scale. Funicle with first and second joints subequal in length, the basal one stouter, clavate; scape scarcely reaching front border of eyes, its groove deep, narrow, well defined, directed towards their middle. Thorax subcylindrical, about as wide as long, its ocular lobes large, almost covering the eyes in repose; disk very coarsely and densely punctate, the punctures mostly covered with large grayish scales, which on the sides are paler, there forming an evident stripe; the nude punctures each bearing an erect brownish hair. Elytra one half wider at base than thorax, humeri rounded, sides parallel to apical third, thence strongly converging and constricted to form the narrowly rounded apex; disk thinly clothed with large grayish scales which are condensed and paler on the humeri and declivity; stria punctures coarse, close-set; intervals narrower than punctures, the third and fifth feebly elevated, each alternate one with a row of erect brownish bristles, these becoming almost white on apical third. Sterna and first and second ventrals of under surface coarsely punctate, the punctures each enclosing a prostrate yellow scale; last three ventrals very finely and sparsely punctate, the fifth with a broad median impression. Length 2.8-3 mm.

Two specimens taken on March 5 in the muck about the decaying roots of *Pontederia* in an extinct pond at Ft. Myers, Fla. Belongs under *aa* of Group III, p. 171, of the Rhynchophora, and resembles *H. minimus* in form and size, but the much broader, more strongly carinate

<sup>1</sup> Trans. Amer. Ent. Soc., XXV, 1898, 155.

<sup>2</sup> See Can. Ent., 1920, 251.

beak, numerous erect stiff bristles, large grayish scales, etc., easily distinguish it. The antennal grooves are deeper and more sharply defined than in the other species of the group.

271. *Grypidius equiseti* Fabr.

Wolcott found an example of this European weevil, June 16, crawling on the sidewalk at Dauphin Park, Ill.; the first record for that State.

285. *Smicronyx squalidus* Casey.

Specimens from Knoxville, Tenn., have been received for determination from S. Marcovitch, Assistant Entomologist at the Tennessee Agricultural Experiment Station. The District of Columbia was the most southern station hitherto recorded.

290. *Smicronyx quadrifer* Casey.

A single specimen of this well-known Erirhinid was taken from the muck in the extinct pond at Ft. Myers. It is a southwestern species previously known only from Alabama, Texas and Arizona.

*Smicronyx rectirostris* new species.

Elongate-oval, convex. Dark reddish-brown, the legs alone paler; above thinly clothed with oblong-oval white scales, which in part are larger and arranged transversely on the thorax, nowhere condensed and not overlapping on the elytra; beneath more thickly clothed with similar scales, those on the sterna larger and almost circular, on abdomen smaller and oblong. Beak of male slender, almost straight, nearly as long as head and thorax, coarsely punctate and scaly on basal half; very finely and sparsely punctate and glabrous beyond the middle. Antennæ inserted at middle of beak, scape not reaching eye, second joint of funicle one half as long as first, one half longer than third. Thorax slightly longer than wide, sides very feebly rounded, disk finely punctate, more densely on sides. Elytra conjointly oval, at base three fifths wider than thorax, sides straight to apical third, thence strongly converging to apex; striæ of disk fine, scarcely visibly punctate; intervals flat, smooth, without setæ. Length 2-2.3 mm.

Two specimens taken August 27 by Prof. J. R. Watson from shrubs in a cypress-gum flatwoods near Gainesville, Fla. Belongs under *cc* of Group II, page 211, of the Rhynchophora and allied to *connivens* Casey, but the beak much straighter, scales less dense, body narrower behind and intervals wholly devoid of the inclined setæ which are very distinct in *connivens*.

321. *Anchodemus angustus* Lec.

This slender-bodied Hydronomid has been recently taken at Gainesville, Fla., by Watson from the flowers of lizard's-tail, *Saururus cernuus* L. Hitherto known from that State only from Lake Poinsett and Biscayne Bay.

324. *Lixellus filiformis* Lec.

A specimen in the Wolcott collection was taken May 30 in the wash-up on the beach of Lake Michigan at Millers, Lake Co., Ind. The first record for the State.

341. *Bagous nebulosus* Lec.

A specimen taken at Irvington, N. J., and labelled *B. obliquus* Lec., was received from Bischoff; also one, taken July 4 by Frost, at Framingham, Mass. Known heretofore only from Lowell, Mass. and Port Huron, Mich. *B. obliquus* is a distinctly smaller species with pale markings of elytra less evident and third joint of tarsi bilobed and wider than second.

Genus *Pseudotychius* new genus.

Oval, very convex, strongly narrowed in front. Eyes large, not prominent, coarsely faceted, almost contiguous. Beak rather stout, slightly longer than thorax, pubescent and striate on basal half, glabrous and sparsely, finely punctate towards apex. Antennæ inserted at apical two fifths, scape slender, clavate, not reaching eye; funicle 5-jointed, the first joint subclavate, slightly curved, second obconical, two thirds as long as first, 3-5 rounded, shorter than second; club long, pubescent, first and second joints globose, terminal one conical, three fourths as long as the other two united. Femora clavate, unarmed; third joint of tarsi strongly bilobed, fourth slender, the claws simple, connate at base. Ventral segments very unequal, the second longer than third and fourth united, very convex, its hind margin overhanging and almost concealing the third, its angles prolonged but not reaching fourth; fifth segment longer than 3 and 4 united, narrowed toward apex.

This genus is founded upon a very aberrant Tychiid taken near Gainesville, Fla. From the characters as above given I am unable to satisfactorily assign it to any of the genera of Tychiini treated in the Rhynchophora. In the pear-shaped form of body, five-jointed funicle and long, very convex second ventral, it differs widely from any other genus of that tribe.

**Pseudotychius watsoni** new species.

Uniform dark reddish-brown, thickly clothed with long, yellowish, prostrate hairs. Occiput convex, as wide as apex of thorax, impunctate. Thorax campanulate, the apex less than half the width of base, disk smooth, sides not margined, base with a very narrow margin. Elytra oval, strongly convex, as wide at base as thorax, sides converging from near the base to a narrowly rounded apex, leaving the pygidium almost wholly exposed; disk rather deeply striate, striae impunctate, intervals strongly convex. Other characters as given under the generic heading. Length 2.3 mm.

This, the genotype, is described from one specimen, probably a female, taken July 7 by Prof. J. R. Watson while beating shrubs in a high hammock near Gainesville, Fla. Named in honor of the collector, who is doing much to make better known the insect fauna of Florida.

**360. Paragoges minimus** Blatch.

Several specimens of this small Tychiid were beaten from clumps of the twining milkweed, *Metastelma scoparia* Nutt., at Chokoloskee, Fla. Hitherto known only from Ft. Myers and Key West.

**Tychius armatus** Green, Ent. News, XXXI, 1920, 198.

Allied to *sordidus* Lec., but having all the femora toothed; length 3.8 mm. Described from six specimens taken on Graybeard Mountain, N. Car., by Beutenmüller.

**Genus Nanodactylus**<sup>1</sup> new genus.

Small, oval or pear-shaped, very finely pubescent species having the beak slender, as long as thorax; eyes large, not prominent, subcontiguous above; antennae inserted at apical third, scape slender, not reaching eye, its apex but slightly enlarged; *funicle 5-jointed*, first joint rather stout, oblong, second slender, obconical, two thirds the length of first, 3-5 subglobose, subequal; club joints loosely united, clothed with erect hairs, the basal joint globose, second one half wider, subglobose, terminal one conical, as long as the other two united. Thorax campanulate, its apex half or less the width of base. Elytra conjointly oval and subinflated, about one third longer than wide, their tips separately rounded, partly exposing the small pygidium. Ventral segments very unequal, the second raised above, overhanging and almost concealing the third, its angles prolonged backward to fourth, the fifth segment as long as but much narrower than the second, bluntly conical in shape, its apex subtruncate. Femora slender, unarmed, tibiae as long as femora; tarsal claws connate throughout, appearing as a single claw, but just visibly cleft at tip.

<sup>1</sup> Gr. "small" + "claw."

This genus is, with some doubt, placed among the Tychiini. In its finely pubescent body, 5-jointed funicle and connate claws it differs widely from the other genera there belonging.

*Nanodactylus obesulus* new species.

Broadly oval, strongly narrowed in front. Head, thorax and basal fourth of elytra dark chestnut-brown; remainder of elytra and antennæ, except club, dull yellow; club of antennæ, middle of femora and tibiæ and entire under surface piceous; above and beneath rather thickly and evenly clothed with very fine, short, prostrate yellowish pubescence. Beak distinctly striate both above and on sides. Thorax one third wider at base than long, sides straight and converging from base to apex; disk very minutely and sparsely punctate. Elytra oval, strongly convex, their base but little wider than that of thorax; striæ narrow, deep, impunctate; intervals much wider, strongly convex, minutely and confusedly punctate. Length 2 mm.

One specimen beaten from alder, May 21, near Bass Lake, Starke Co., Ind.

370. *Oöpterinus perforatus* (Horn).

The first known Indiana example of this peculiar weevil was taken by A. B. Wolcott, June 21, while beating shrubs on the side of a wooded ravine at the State Soldiers' Home near Lafayette, Tippecanoe County.

420. *Anthonomus julichi* Dietz.

One example of this rare species was received from Chokoloskee on September 1. Recorded heretofore only from the type locality, Upper Metacombe Key, Fla.

426. *Anthonomus virgo* Dietz.

Two specimens were taken by sweeping near Half Moon Pond, Posey Co., Ind., Sept. 12, 1918. Cobb's Island, Va., the type station, is the only one hitherto known.

435. *Anthonomus consimilis* Dietz.

A single individual was taken May 15 while sweeping along the slope of a wooded ridge near White River, Marion Co., Ind. The only other known Indiana specimen was from Lawrence County. One was also sent in by Frost from Hopkinton, Mass. Not before known east of the District of Columbia.



**458. *Anthonomus disjunctus* Lec.**

Five specimens have been taken at Dunedin, Fla., December 1-16, by sweeping the foliage of huckleberry and other low shrubs in open pine woods. Not known heretofore from that State.

***Anthonomus parvulus* new species.**

Subovate, robust. Dark reddish-brown; beak, head, antennal club, tarsi, suture and a large scutellar triangular spot on elytra darker chestnut-brown; above very thinly pubescent with exceedingly fine white hairs, which are condensed on the scutellum and in one or two minute patches along the edges of the denuded fascia, which is evident but very faint. Beak relatively stout, curved, about as long as thorax, minutely and sparsely punctate. Antennæ inserted at apical fourth, scape very slender, reaching lower border of eye; funicle 6-jointed, joint 1 stout, obconical, 2 about half the length and diameter of 1, slightly longer than 3 to 6, which are subglobose and gradually increase in size. Thorax strongly shining, one third wider at base than long, sides almost straight, feebly converging to apex; disk slightly constricted near apex, coarsely punctured, the punctures separated by as much as their own diameter. Elytra oval, one fourth wider at base than thorax, striæ fine, feebly impressed, their punctures fine, well separated; intervals almost flat, each with a row of minute punctures. Fore femora with a slender acute tooth at apical fourth, middle and hind ones unarmed; claws with a large basal tooth. Length 1.2 mm.

Three specimens, two taken at Dunedin, Fla., December 1, by sweeping low shrubs in open pine woods, the other at Lakeland, Fla., February 21, by beating tall huckleberry bushes. Belongs to Group A of the subgenus *Sexarthrus*, p. 311 of the Rhynchophora. Allied to *subfasciatus* Lec., but much smaller, with punctuation of thorax coarser and much sparser, denuded fascia of elytra very faint, and only the front femora armed. It is the smallest known member of the subgenus, and one of the smallest of the Anthonomini.

**464. *Anthonomus nubilus* Lec.**

Taken in recent years in both Knox and Crawford counties, Ind., Orange County furnishing the only previous State record.

***Anthonomus pictus* new species.**

Oblong-oval. Piceous, densely and evenly clothed above with minute oval pale brown and white scales, the white ones forming a median and two lateral stripes on thorax, covering the basal half of fifth and median third of third elytral intervals, also the scutellum and a small sutural space

behind it and an irregular spot on the declivity; under surface and femora more thinly clothed with larger oval white scales, tibiae and tarsi dark reddish-brown; antennae paler, the club densely pubescent. Beak slender, feebly curved, as long as head and thorax, finely striate and scaly on basal half, slightly flattened and densely punctate toward apex. Antennae inserted at apical two fifths, scape very slender, not reaching eyes; funicle 6-jointed, second joint slender, obconical, three fourths as long as the next two united, 3-6 small, subglobose, subequal. Thorax about as wide as long, sides almost straight and parallel from base to middle, then converging to apex; disk not constricted near apex, finely and densely punctate. Elytra oval, convex, one fourth wider at base than thorax, sides parallel to apical third, then broadly curved to apex; striae fine, their punctures well separated; intervals flat. All the femora unarmed; claws with a small basal tooth. Length 2.1-2.3 mm.

Described from three specimens taken by E. A. Bischoff at Newark, New Jersey. Belongs under *aa* of Group B of the subgenus *Sexarthrus*, p. 313 of the Rhynchophora, but not closely allied to either *nubilus* or *cylindricollis*, as the beak is much longer and the scales much more dense and differently arranged than in *nubilus* while *cylindricollis* is pubescent, not scaly. Bischoff reports taking them in some numbers while sweeping, June 13-August 24, in both low meadow land and on mountain slopes near Newark, Irvington, Bloomfield and Montclair, N. J.

467. *Anthonomus decipiens* Lec.

The first Indiana specimen was swept from herbage alongside of a bayou of White River in Marion Co., September 4, 1920.

487. *Miarus hispidulus* Lec.

Within the last two years a number of specimens have been taken while sweeping along the margins of a pond in a dense woodland near Broad Ripple, Ind.; one also in Crawford Co., Ind.

491. *Cleonus* (*Stephanocleonus*) *plumbeus* Lec.

I was much surprised to receive for determination a specimen of this Cleonid from Knoxville, Tenn. It was reared in July from the roots of strawberry by S. Marcovitch. The hitherto known range has been from New England to British Columbia, Southern Colorado and New Mexico.

(To be continued)

## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

### MEETING OF MAY 3.

A regular meeting of the New York Entomological Society was held at 8 P.M., on May 3, 1921, in the American Museum of Natural History, President John D. Sherman, Jr., in the chair with 19 members present.

In view of the Treasurer's statement as to cost of furnishing reprints, it was, on motion of Dr. Lutz, voted to double the charge therefor in future.

Mr. J. A. Tyson, 626 Ave. H, Brooklyn, was elected an active member.

Mr. H. B. Weiss read an exhaustive paper on "Gypsy Moth Control in New Jersey" which will be printed elsewhere. It was copiously illustrated by photographs and specimens; and, especially in the astonishing figures of the expenditures involved, excited great interest. The spread seems to be towards the ocean in New Jersey and Mr. Weiss thought something was bound to get by sooner or later.

Mr. E. A. Bischoff exhibited his collection of the small and difficult weevils of the genus *Apion*, remarking that while among the smallest and least known of beetles, their variations in form, in length of snout, in color and form of legs, made them of great interest. Of the 28 species in the New Jersey List, 25 had been collected as well as 3 more probably new. The food plants of 9 species are known. Long series, carefully mounted by Mr. Bischoff and identified by Mr. H. C. Fall, were exhibited.

Dr. Bequaert in reviewing Carpenter's "Naturalist on Lake Victoria" gave a minute account of that author's remarks on sleeping sickness and of his own observations thereon while in Africa, using lantern slides to illustrate his remarks.

The impossibility of the disease being transmitted in this country, where the tsetse fly does not occur, was emphasized.

### MEETING OF OCTOBER 4.

A regular meeting of the New York Entomological Society was held at 8 P.M., on October 4, 1921, in the American Museum of Natural History, President John D. Sherman, Jr., in the chair, with 24 members and two visitors present.

The Curator announced that the second and fourth Saturday of each month would find him in attendance in his room on the fifth floor, for the benefit of those wishing to study the local collection.

Mr. Davis proposed Mr. John Tee-Van for active membership.

Mr. Barber proposed Mr. Mortimer D. Leonard.

On motion by Mr. Woodruff, the by-laws were suspended and both gentlemen were immediately elected.

The President called for notes on summer collecting.

Mr. Olsen exhibited an entirely red specimen of *Acanalonia bivittata*, an entirely blue *Drachulacephala mollipes*, the second New Jersey specimen of *Caresa albescens*, and *Archasia belfragei*.

Mr. Dickerson spoke of his local collecting trips with Mr. Bischoff and of the excellence of some of the localities.

Mr. Neilsen described his results in collecting Mantids.

Mr. Tee-Van mentioned some of his successes in British Guiana, and promised to speak at greater length at a subsequent meeting.

Messrs. Mutchler, Quirsfeld and Angell spoke briefly.

Mr. Shoemaker had been as usual very active with visits to Wayne Co., Pa., in June, Washington in July and again in September. 140 traps were planted along the Potomac River and Cabin John Run, and with the help of Messrs. Davis and Nicolay, 33 *Cychnus* and countless other insects were found in the molasses. Some of the *Cychnus* were found under stones and logs.

Dr. Lutz had made several trips to Interstate Park and Brown's Mills, N. J., in his new camping, collecting automobile (of which photographs were shown), with a view of testing its capability for work in the Rocky Mts. next summer.

Mr. Woodruff, collecting near Litchfield, Conn., had added a few beetles to the Conn. list and some new facts re Membracids. He mentioned also with pleasure visits from Professor Wheeler and Wm. Beebe.

Mr. Nicolay had also spent much of the summer in the field. Besides being in Washington with Messrs. Shoemaker and Davis, he had sifted assiduously for Pselaphidæ at Montclair and Avon and had made one extensive trip to the summit of Mt. Washington with Mr. Mason of Philadelphia. There in June Carabidæ were abundant, but collecting otherwise had been disappointing.

Mr. Davis had preferred to visit warmer climates than Mt. Washington and spoke of his visit to Colonel Robinson's home on the James River, Virginia, and the trip to Washington, when he stayed with Clarence Shoemaker in Georgetown. One of the results of this trip is the note on Katyids published in "Miscellaneous Notes" in which one of the results of his nocturnal wanderings on Staten Island also appears. He exhibited these Katyids and a female of the large black bot-fly *Cuterebra buccata*, taken at Tottenville, Staten Island, June 3, 1921. The fly when first seen was hovering about the low vegetation in a narrow lane. It flew away but returned, and again hovered about the low plants, when it was captured. He suggested that the insect might have been in the act of laying eggs in a suitable spot frequented by rabbits. Those animals often return again and again to the same place to feed, and he instanced a garden in Virginia where they paid particular attention to one part of a row of beans. On behalf of Mr. Edward J. Burns, he showed a female *Cuterebra cuniculi* collected at Sand's Point on Long Island, July 2, 1921. In this instance the fly was a little distance out on a meadow bordering the salt marsh.

Mr. Davis also presented a bound copy of his papers on Cicadas heretofore published in the JOURNAL.

Mr. Barber described his unusual experiences at Indian Lake, 23 miles by stage from North Creek in the Adirondacks, where, at an elevation of 1,600 ft., in August he had found many rare Hemiptera hiding amid the basal leaves of mullein. He promised to give more details at the next meeting.

Dr. Marchand described his success at Mendham, N. J., in sieving the larvæ of *Chrysops* and Tabanid flies from the mud of brooks and ponds with a kitchen strainer and in subsequently rearing some adults. Later in the summer he had observed some new facts in the oviposition of *Megarhyssa*.

Mr. Engelhardt had also some experiences with *Megarhyssa* to relate, especially of males waiting for female to emerge. He spoke also of his success in tracing early stages of clear-wings and of finding a new species in flat white topped aster. He had made two auto trips to Vermont and had found Hepialidæ there; and a trip to Washington during which he visited Plummer's Island and found a rare species of *Papaipema* now in the hands of Mr. Bird. Mr. Engelhardt described with enthusiasm the pack rats of Plummer's Island and the persimmons of nearby Virginia.

Mr. Ruckes described the eggs, 1 mm. long, of certain Tingitidæ he had found in the New Jersey pine barrens and the pushing off by the emerging nymph of the lid at one end.

Dr. Bequaert spoke of a visit to Boston where he found one of Prof. Wheeler's students working out an interesting and novel method of studying life history of Chrysid wasps. He showed also an illustration of the variations in the markings of the palm weevil, in the Guide to Nature, and a Boston and Maine R. R. folder, in which illustrations of Mt. Washington butterflies appeared with text by C. W. Johnson, who had given them to him. Dr. Bequaert had also visited Washington and while there found on Plummer's Island the fossorial wasp since described by Nathan Banks as *Entomognathus memorialis*. Then he went to Ithaca and in company with Prof. Bradley investigated the tract of wild land known as McLean Bogs, which had been presented to Cornell University by the uncle of Mr. J. T. Lloyd, and found among other interesting things a bright red ant, *Aphano-gaster tennesseensis*, nesting in very moist stumps.

Dr. Bequaert also contributed to the minutes newspaper clippings relating to a visitation of fleas in the city.

Dr. Sturtevant said he would speak later of his year and a half in California and mentioned only his discovery of *Drosophila sigmoidea* at Fort Lee, N. J., on October 2.

Mr. Bell had devoted his summer to collecting Hesperiidæ on Long Island.

Mr. Hall had spent two weeks collecting butterflies in the Rocky Mts.

Mr. Johnson had made an interesting observation on the behavior of *Polistes* wasps, whose nest was destroyed late in the summer; whereupon they apparently despaired of completing another, and took possession of a deserted nest of *Vespa maculata*.

This prompted Mr. Engelhardt to tell of a *Vespa crabro* nest in a shelter in Prospect Park, with an upper and lower entrance and containing hundreds of these large wasps. Many unsuspecting persons use the seats in the shelter and though their heads are only four or five feet from the nest, no one has yet been stung.

Mr. Davis said he believed *Vespa* could actually be tamed. He knew of a nest near a window sash that was continually being raised and lowered without annoyance to the wasps.

Mr. Leng told of the re-discovery by Warren Knaus of *Cicindela nevadica*.

Mr. Sherman spoke of the success of Chas. B. Wilson at Fairport, Iowa, in breeding water beetles and of the great changes, due to increased tourist travel, in the White Mts. where all the accommodations are constantly in use and it is now not unusual to meet fifty people a day on the trails. Mr. Sherman mentioned his acquisition of the correspondence of Philip R. Uhler and of its extraordinary interest from the number of people who had appealed to Uhler for entomological aid.

Mr. A. G. Penrod, 516 West 175th St., exhibited, as a visitor, about forty photographs of entomological subjects. They were all on 8 x 10 plates, taken by such skilful management of the light that every detail was reproduced.

#### MEETING OF OCTOBER 18.

A regular meeting of the New York Entomological Society was held on October 18, 1921, at 8 P.M., in the American Museum of Natural History, President John D. Sherman, Jr., in the chair, with 22 members and 4 visitors present.

Mr. Davis announced that the Brooklyn Museum had on exhibition in the main hall Mr. Shoemaker's large picture of butterflies and moths, in which hundreds of species are represented in color. The extraordinary patience and skill which have contributed to produce this accurate piece of work make its completion one of the entomological events of the year.

Mr. Davis called attention also to the article by Mr. Weiss in *The Scientific Monthly* on "Field Crop Yields in New Jersey from 1876 to 1919" as an example of splendid statistical work, bringing out clearly the increased productivity of New Jersey farms and the causes; and to an interesting article by P. M. Buck, Jr., entitled "In Praise of Ants," published in the *Independent and Weekly Review*, from which he read some entertaining selections.

Mr. Barber read a paper "Collecting Hemiptera in the Adirondacks" illustrated by several boxes of specimens. The locality was Sabael, on Indian Lake, in Hamilton County, at elevations of 1,800 feet or more. Among the basal leaves of mullein, *Spharobius insignis*, resembling a fairly large



black ant in behavior as well as appearance, was not uncommon. Hiding in the dead leaves and moss among the grass roots he found *Ptochionera ferruginea*, a species hitherto rare in collections, *Plinthis compactus*, *Kolenetrus planus*, *Xestocoris nitens*, *Stygnocoris ferrugineus* and *Trapezotus arenarius*. In the thick layers of leaves of several years accumulation, several other species were found, and in the moss that grew in damp shady spots still more, including the European *Sciocorus microphthalmus* and *Stynocoris rusticus*. Along with these Hemiptera, mostly obtained by sifting, were many beetles which had been turned over to Mr. Notman; and to take in a single summer five or six rare species in such numbers, Mr. Barber characterized as quite an event.

Mr. Barber mentioned that the Homoptera shown had been identified by Mr. C. E. Olsen.

Dr. Bequaert delivered an address on "Hymenoptera Accidentally or Purposely Introduced in the United States" on which subject he said his studies, while still incomplete, showed about 50 such species already, of which 19 were certainly intentional introductions. The difficulty of separating circumpolar from introduced species of early date; the history of the introduction of hymenopterous parasites to combat economic pests; and the early records of honeybees were given with references to early travels, etc., in which mention of them had been found. The causes which prevented rapid dispersal in some instances were discussed by Dr. Bequaert and by several members at the close of his remarks.



THE  
NEW YORK ENTOMOLOGICAL SOCIETY

Organized June 29, 1892.—Incorporated June 7, 1893.

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The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

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OF THE

## New York Entomological Society.

Published quarterly by the Society, at 41 North Queen St., Lancaster Pa., and New York City. All communications relating to the JOURNAL should be sent to the Publication Committee, New York Entomological Society, American Museum of Natural History, New York City; all subscriptions to the Treasurer, Wm. T. Davis, 146 Stuyvesant Place, New Brighton, Staten Is., New York, and all books and pamphlets to the Librarian, Frank E. Watson, American Museum of Natural History, New York City. Terms for subscription, \$2.00 per year, strictly in advance. *Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY*

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VOL. XXX.

September, 1922

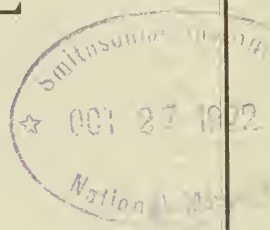
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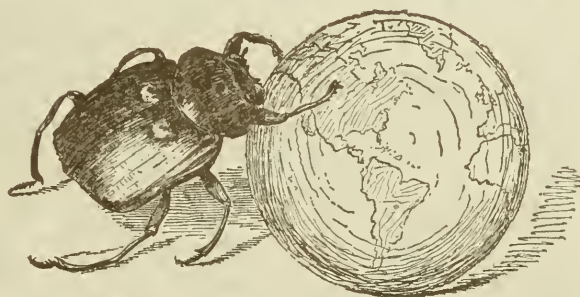
OF THE

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Devoted to Entomology in General.



SEPTEMBER, 1922.

Edited by HOWARD NOTMAN

*Publication Committee.*

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Published Quarterly by the Society.

LANCASTER, PA.

NEW YORK CITY.

1922.

[Entered April 21, 1904, at Lancaster, Pa., as second-class matter under Act of Congress of July 16, 1894.]

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# JOURNAL

OF THE

## New York Entomological Society.

---

VOL. XXX.

SEPTEMBER, 1922.

No. 3

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### NOTES ON THE RHYNCHOPHORA OF EASTERN NORTH AMERICA, WITH CHARACTERIZATIONS OF NEW GENERA AND DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY,

INDIANAPOLIS, IND.

(Continued)

501. *Lixus leptosomus* Blatch.

Two specimens were taken April 11 while sweeping low herbage along a railway embankment near Dunedin, Fla. The unique type, the only specimen hitherto known, was from Sanford, that State.

*Lixus bischoffi* Fall, Bull. Brook. Ent. Soc., XVI, 1921, 40.

A species allied to *concarvus* Say but with elytra distinctly wider than thorax; antennal club shorter and stouter, scarcely longer than half the funicle; length of body 13 mm. Five specimens were taken by Bischoff early in September from a large flowering thistle near Berkeley Heights, N. J.

*Lixus cavicollis* new species.

Elongate, subcylindrical. Black, thinly clothed above with very short, fine, ash-gray hairs, these condensed to form a vague pale stripe along sides of thorax and elytra; beneath more thickly clothed with longer similar hairs; antennæ reddish-brown, tarsi piceous. Beak stout, a little shorter than head and thorax, feebly curved, densely reticulate-punctate and with a shallow elongate fovea between the antennal pits at apical third. Antennæ stout, scape not reaching eye, first joint of funicle two thirds the length of second, the latter one half longer than third and fourth united. Thorax subcampanulate, one fifth wider at base than long, sides almost straight, gradually converging from base to apex; disk with widely scattered coarse

punctures, with numerous minute ones intervening and with a large, deep median concavity on basal half, this continuous with a wider, more shallow one on basal third of elytra, which is gradually evanescent posteriorly. Elytra as wide at base as thorax, two and two thirds times as long as wide, distinctly constricted behind the basal angles; sides parallel to apical third, tips subacute but not prolonged; punctures of striae round, rather coarse, separated by less than their own diameters. Length 17 mm.

One male in Wolcott collection, taken by him June 17 on the beach of Lake Michigan, at St. Joseph, Mich. Belongs under *b* of the key to Group II, p. 340 of the Rhynchophora. Allied to *deceptus* but much larger, the beak with a very different sculpture and much longer. From *fimbriolatus* it differs in length and sculpture of beak, relative length of funicular joints, lack of pale pubescent spots on elytra, etc.

519. *Læmosaccus plagiatu*s (Fabr.).

A number of specimens were taken at Dunedin in early April by sweeping oak sprouts that had sprung up over a recently burned-over tract; also one at porch light. This is the most southwestern Florida record.

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The most important work treating of any section of North American Rhynchophora, which has appeared since 1916, is Col. Casey's "Some Descriptive Studies Among the American Barinæ," which embraces pp. 300-516 of his Memoirs, IX, issued April 8, 1920. In it he founds 23 new genera and describes as new 368 species, 132 of which are from the territory covered by the Rhynchophora. No key to subtribes or genera is given, and a student unfamiliar with the group and having a specimen in hand which cannot be placed by the Rhynchophora or other work must compare it with the description of each of the new genera until it is located. The same criticism may be made of his treatment of the new species of *Baris*, 77 species of the genus being described with no key for their separation.

On account of a lack of space and unfamiliarity with the great majority of the forms described by Col. Casey, I can, in this paper, only call attention to some of the more important changes he has made in the nomenclature of the species of Eastern Barini recognized in the Rhynchophora, and mention a few of his species which I have been able to see.

523. *Baris strenua* (Lec.).

In his work Casey has made this a synonym of *B. transversa* Lec., agreeing with the authors of the Rhynchophora that his former placement of *transversa* and *interstitialis* Say under the name *transversa* was wrong. Say, in the original description of *transversa*, states that the third interval (interstitial line) has more than one series of punctures, whereas both second and third intervals of *strenua* have two or more. In the absence of Say's type no one can properly place *transversa*. In my opinion it is as likely to be *callida* Casey as it is *strenua* Lec.

534. *Baris punctiventris* Casey.

A single individual was taken in Knox Co., Ind., October 15, by sweeping along the edge of a cypress swamp. It was described from that State but without a definite locality.

Of the 77 species of *Baris* described as new by Casey, 27 are attributed to the territory covered by the Rhynchophora. As the authors of that work studied the Barinini of all the large collections in the country except that of Col. Casey, and recognized only 30 species of *Baris* as valid from the entire area covered, their concept of what constitutes a species cannot but be widely divergent from that of Col. Casey.

533. *Cosmobaris* (*Baris*) *scolopacea* (Germ.).

This species, as recognized in the Rhynchophora, has been made the type of the new genus *Cosmobaris* Casey and described as new under the name *C. americana*. He states that the European *scolopacea* "is narrower and more cylindric with the pronotum squamose throughout; the scales of the elytra more uniformly oval and dense." Until opportunity is given to study and compare a large series of both European and American forms, I prefer to retain the old specific name.

554. *Stenobaris avicenniae* Linell.

A single example received from Chokoloskee was taken September 1, and another was secured at Cape Sable, February 20, while beating the black mangrove, *Avicennia nitida* Jacq. Linell's types were taken from the same shrub at Punta Gorda, and the only other known station is Cocanut Grove mentioned in the Schwarz Ms.

557. *Madarellus undulatus* (Say).

This species, as recognized in the Rhynchophora, has been split into three by Casey. The two new ones described are *inconstans*, "smaller and narrower than *undulatus*, with beak of female only as long as head and thorax," from Massachusetts, Indiana and Iowa; and *floridanus*, "with coarse lateral punctures on pronotum and flanks of elytra," described from a single specimen from Southern Florida. In Five Florida specimens of *undulatus* at hand, one from Ormond, three from Dunedin and one from Utopia, on Lake Okeechobee, the sculpture varies, becoming more coarse and dense as we go farther southward, so that the Utopia specimen agrees very well with Casey's *floridanus*. I consider it as, at the most, a geographic race.

559. *Aulobaris pusilla* (Lec.).

Specimens have been received from Marcovitch taken at Knoxville, Tenn., this being the first southern record west of North Carolina.

561. *Aulobaris nasuta* (Lec.).

This species has been recently collected by me in both Harrison and Crawford counties, adjoining the Ohio River, in Southern Indiana. They were taken August 4 and September 26, while sweeping low shrubs on high wooded slopes. It was known heretofore only from Mississippi, Iowa and Kansas. My identification was verified by Col. Casey. In his recent paper he describes two new species of the genus, *amplexa* and *misera* from near Evansville, Ind.

567. *Pseudobaris sobrina* Blatch.

Casey reports having examples of this from the Black Mountains, North Carolina. He describes as new, without key, 20 species of the genus, eight of them from east of the Mississippi.

577. *Centrinaspis* (*Centrinus*) *grisescens* (Casey).

This Barid has proven to be quite common in Marion Co., Ind., where it occurs in May and June on low shrubs along high wooded slopes. Up to 1916 but a single specimen was known from the State. The genus *Centrinaspis*, with *Centrinus perscillus* Gyll. as the type, was erected by Casey for this and allied forms. The other species treated in the Rhynchophora which he assigned to the new genus

are *Centrinus picumnus*, *penicellus* and *perscitus* Hbst., *C. falsus* Lec. and *C. albotectus* and *clarescens* Casey. He describes as new, without key, 31 species of the genus, six of them from the territory covered by the Rhynchophora.

***Centrinaspis repens*** Casey, Memoirs, IX, 1920, 396.

Two specimens are at hand, one beaten from oak at Dunedin, Fla., Nov. 9, the other taken September 15 on blossoms of horsemint (*Monarda*) near Gainesville by Watson. Casey's type was from Gulfport, Fla. Of it he says: "The shining black upper surface, with rather sparse white vestiture, long basal funicular joint, small oval antennal club, and the rather broadly suboval outline of body, are the most striking external features."

***Centrinaspis rhomboida*** new species.

Broadly rhomboid-oval. Black, densely clothed above with coarse elongate white scales, those on the thorax all arranged transversely; under surface similarly clothed, the scales on meso- and metasterna and abdomen shorter and more oval than those on prosternum; antennæ reddish-brown, the club pale brown. Beak of female slender, as long as head and thorax, scaly at base, glabrous, finely and sparsely punctate, narrowed and compressed beyond the antennal insertion which is at the middle. Antennæ slender, scape not reaching eye; first joint of funicle as long as the next two, second one half longer than third. Occiput glabrous, alutaceous, minutely and sparsely punctate. Thorax one third wider at base than long, sides almost straight from base to middle, then rounded and converging to the subtubulate apex, the disk with small, very dense ocellate punctures. Elytra widest just behind the humeri, their sides thence strongly converging to apex, their length only one fifth more than their greatest width; striæ deep, intervals each with three rows of coarse, close-set alternating punctures, each of which bears an elongate prostrate scale. Length 4 mm.

One female, taken at Sanford, August 3, on a species of *Cassia*. I at first thought this to be a form of *C. perscilla* Gyll., but sent it to Col. Casey, who passed upon it as follows: "Belongs to the *perscilla* group but is broader and more rhomboidal than that of any of our allied species. Resembles the Mexican *podogrosa* Champ. very closely in size, form and sculpture, but lacks the four small denuded elytral spots of that species." The scales are paler, coarser and more loosely placed, and the antennal club larger and paler than in examples of *perscilla* at hand.

575. *Pycnogeræus (Centrinus) modestus* (Boh.).

Casey, loc. cit., p. 389, has made this species the type of a new genus, *Pycnogeræus*. He includes in it with *modestus*, *C. striatirostris* Lec. and *tortuosus* Casey. Several specimens of *modestus* have been taken at Dunedin and Gainesville. At the former place it occurs in late autumn on low shrubs in sandy open woodland.

587. *Odontocorynus pinguescens* Casey.

In addition to the Indiana localities mentioned in the Rhynchophora, this species has been taken in Lake, Putnam and Marion counties, so that it probably occurs throughout that State. It is possible that some of the examples at hand represent forms described as new by Casey, he having added 51 species to the genus, 28 of them from the Eastern States. Only five from that region were recognized in the Rhynchophora. Nine of Casey's new forms are from Kentucky and three from Indiana.

*Nicentrus wyandottei* new species.

Elongate-oblong, robust. Piceous-black, antennæ and legs reddish-brown, above densely clothed with elongate dull yellow hair-like scales, those on thorax arranged transversely, those on elytra in two or three rows on each interval; scales on scutellum a brighter yellow; beneath thickly clothed with smaller oval or oblong paler scales. Beak stout, curved, as long as head and thorax, striate-punctate and scaly on sides. Thorax but little wider than long, sides straight on basal half, thence broadly curved to apex, the latter feebly constricted, one half as wide as base; disk densely and finely strigose-punctate. Elytra as wide at base as thorax, only about one third longer than wide, their sides very gradually converging from basal fourth to the broadly rounded apex; striæ narrow, deep; intervals flat, each with two or three rows of coarse, alternating shallow punctures; under surface finely and densely punctate; first ventral with a large median impression. Length 3.3-4 mm.

Two males, taken August 4, by sweeping low shrubs on a wooded slope near Wyandotte Cave, Crawford Co., Ind. Near the Florida species *grossulus* and *parallelus* of Casey, but with body less robust, thorax not inflated and scales longer than in *grossulus*, and thorax wider, with sides less parallel and scales of under surface more dense than in *parallelus*. Casey, in his Memoirs, IX, has described seven new species of *Nicentrus* from the eastern States.

602. *Anacentrus (Limnobaris) bracata* (Casey).



A single specimen, differing from those found in Indiana only in having the ground color black instead of reddish-brown or piceous, was taken March 2 at Dunedin, Florida. It is the first record for that State. To a new genus, which he calls *Anacentrus*, Casey, *loc. cit.*, p. 463, has assigned this species as the genotype, and includes with it all the other species of Group A of *Limnobaris* as treated in the Rhynchophora, p. 394. He describes as new 13 additional species, only two of which are from the Eastern States, viz., *ornatus* from Missouri, Tennessee and Indiana, and *oculatus* from North Carolina.

For *Limnobaris rectirostris* and *calva* Lec., members of Group B of the Rhynchophora, he founds the genus *Dirabius* with *rectirostris* as the genotype, and describes six new species from the Eastern States. For *L. grisea* Lec., also a member of Group B, he erects the genus *Barilepsis* and describes *virginica* from Virginia. With *L. confinis* Lec. as the genotype, he founds the genus *Sibariops* and assigns to it *L. confusa* Boh., *putcifera*, *fratercula* and *concurrens* Casey, and *concinna* Lec., all members of Group B, and adds to it 22 new species from east of the Mississippi.

**615. *Cylindridia* (*Limnobaris*) *prolixa* (Lec.).**

This species is made the type of the new genus *Cylindridia* and three other species included with it. Casey suggests that my *Limnobaris tenua* (No. 618 of the Rhynchophora) possibly belongs to the genus, but as the type is evidently a male without antecoxal processes, their absence precludes it.

***Haplostethops caviventris* new species.**

Elongate-oval, robust. Black, feebly shining; antennæ, tibiæ and tarsi reddish-brown; above very thinly clothed with long hair-like whitish scales, which in fresh specimens are arranged transversely on the thorax, and condensed along its median line and in a vague stripe each side, and on the elytra are more numerous on the declivity; beneath with very small oval whitish scales, strongly condensed on the metasterna and along the sides of abdomen, and large elongate ones more thinly placed on the pro- and mesosterna. Beak of male stout, strongly curved, as long as head and thorax, finely striate, rather densely punctate and scaly, the antennæ inserted at apical third; of female, slightly longer and more slender, almost smooth and glabrous, the antennæ near the middle. Thorax almost one fourth wider than long, sides slightly curved and constricted before the subtubulate apex, disk with a very narrow, smooth median line, above finely and densely punctate, on sides

minutely striate-punctate, the punctures coalescent. Elytra slightly wider at base than thorax, striæ fine, impunctate; intervals twice as wide as striæ, their edges slightly raised, each with a row of fine, close-set punctures. Abdomen finely and densely punctate, glabrous at middle, the first ventral in the male with a broad, deep concavity. Length 3-3.5 mm.

Twenty or more individuals were taken May 22 while sweeping herbage in a dense woodland along the bank of White River, Marion Co., Ind., and a single specimen two miles below the type locality on Sept. 18. Casey has made his *Idiostethus ellipsoideus* (Rhynchophora, p. 405) the type of the new genus *Haplostethops*, and described as new five species from St. Louis, Mo. This Indiana species differs from all in the longer and more abundant vestiture of the upper surface and especially in the large ventral impression of the male.

622. *Idiostethus subcalvus* (Lec.).

Example of this species, taken at Knoxville, Tenn., were received from Marcovitch. Not hitherto known south of Kentucky. To the genus *Idiostethus*, as recognized in the Rhynchophora, Casey adds ten new eastern species.

627. *Stethobaris commixta* Blatch.

On page 506 of his Memoirs, IX, Casey states that he regards a Massachusetts specimen, wrongly identified by him as *ovata* Lec., "as properly the type of *commixta*." How he comes to this conclusion is beyond my comprehension. The type is a male in my collection taken in Steuben Co., Ind., May 27, 1900, as stated on page 407 of the Rhynchophora. He regards his *congermana* as distinct from both *commixta* and *ovata* Lec., and adds three new species to the genus, one of them, *collaris*, from Florida.

*Barinus lutescens* (Lec.).<sup>1</sup>

A single specimen of this handsome Barid was swept from herbage in low cultivated grounds near Dunedin on March 26. It was described from Columbus, Texas, and has not been recorded elsewhere.

*Barinus elusus* Blatch.<sup>2</sup>

The types of this species were taken near Dunedin, March 30, April 19, by sweeping along a roadway through a dense hammock.

<sup>1</sup> Trans. Amer. Ent. Soc., VIII, 1880, 218.

<sup>2</sup> *Barinus elusus* Blatch., Can. Ent., LII, 1920, 264.

It is allied to *cribricollis* Lec., but is distinct in the more slender form, arrangement of vestiture, longer thorax, alutaceous surface, etc.

645. *Eunyssobia echidna* (Lec.).

Scores of this little bristly weevil were taken at intervals throughout the past summer from the trunk of a dying beech tree near Broad Ripple, Marion Co., Ind. On sunny afternoons they would be found singly, running rapidly about on the bark, but in cloudy weather they congregated together in small clusters. It is probably a common species on dying beech throughout its range.

653. *Cylindrocopturus nanulus* (Lec.).

Five examples were beaten April 26 from the foliage of *Ampelopsis* in low moist grounds near Dunedin, Fla. One of the males is very close to, if not identical with, *C. floridanus* Casey, which Leng in his Catalogue has made a variety of *nanulus*.

658. *Psomus armatus* (Dietz).

On p. 278 of the Rhynchophora it was stated that the *Orchestes armatus* of Dietz (1891) and the *Psomus politus* of Casey (1892) were the same, yet on p. 424 the species was treated erroneously under Casey's name. Specimens have recently been taken in Starke and Marion counties, Ind. Dietz's type was from Allegheny, Pa. Varies in color from shining black to pale reddish-brown, two evidently mature specimens of the latter hue, taken in June at River Crest, Ill., having been sent me by Wolcott.

### Tribe *Echinaspini* new tribe.

Small oval, robust species, having the body broad behind, strongly tapering in front; eyes very small, finely faceted, widely separated; beak in repose concealed in a deep prosternal groove; thorax at base much narrower than elytra, without ocular lobes; front coxæ widely separated, pectoral groove wide, deep, extending into the mesosternum; legs very short, femora not clavate; fourth tarsal joint nearly as long as the others united, claws simple, strongly divergent; abdomen horizontal, ventral segments unequal; pygidium concealed.

Evidently belongs between the tribes Zygopini and Ceutorhynchini, differing from the former in its small, remote eyes, and from the latter by the lack of ocular lobes.

Genus *Echinaspis*<sup>1</sup> new genus.

Form pear-shaped. Body above bearing numerous erect stout, blunt bristles. Beak stout, feebly curved, a little shorter than thorax. Antennæ inserted at apical fourth of beak, their grooves shallow, directed beneath; scape slender, not reaching eyes, funicle 7-jointed, basal joint stout, robust, second slender, one half longer than third, 3-6 stouter, subequal, slightly wider than long, 7 one half wider than 6, all very compactly united; club short, oval, compact, the middle joint the widest. Front of thorax feebly produced above the occiput. Elytra conjointly oval, subinflated. Femora very short, unarmed; tibiæ still shorter, sinuate, and narrowed at base, ending in a minute spur; three basal joints of tarsi very short, subequal, the third narrowly bilobed. Second and fifth ventral segments each about as long as third and fourth united, all gradually narrowing posteriorly. Other characters as given under the tribal heading.

Both tribe and genus are based upon a remarkable echinose little weevil that has been unnamed in the Wolcott collection since 1904. Its bristly appearance at once recalls the little Barid *Eunyssobia cchidna* Lec., its bristles being as numerous but not as long or sharp as there. It was sent by Wolcott to Fall some years ago for examination. He returned it stating "I never saw it before, nor can I get any clue to it." From its characters, as above given, it will be readily seen that it does not belong to any of the tribes or genera treated in the Rhynchophora.

*Echinaspis wolcottii* new species.

Oval, pear-shaped. Elytra chestnut-brown; thorax, femora and under surface dark reddish-brown; beak, antennæ, tibiæ and tarsi paler. Beak subcylindrical, a little widened toward apex, finely strigose-punctate. Thorax campanulate, as broad at base as long, without margins; sides converging from base to apex; disk finely and densely rugose-punctate and bearing numerous erect bristles. Elytra oval, gibbous, declivous behind, two thirds wider at base than thorax, about one fourth longer than wide; sides broadly curved, converging behind middle to the conjointly rounded apex which is somewhat constricted above at the base of the declivity; striæ rather wide and deep, punctate; intervals as wide as striæ, each with a row of distant punctures, each puncture bearing a stout grayish erect bristle. Abdomen coarsely, not densely punctate, each puncture bearing a minute prostrate yellow hair. Length 2 mm.

One specimen taken by A. B. Wolcott, of the Field Museum, July 3, 1904, at Bowmanville, Ill. Type in his collection.

<sup>1</sup> Gr. "bristle" or "spine" + "shield."

662. *Acanthoscelis curtus* (Say).

Examples are at hand from Gainesville, Fla., taken June 21 by P. W. Fattig. They have the middle and hind tibiae enlarged and toothed toward apex, which precludes their being the *mendicus* of Dietz. Not before recorded south of Virginia.

685. *Ceutorhynchus quadridens* Panz.

A single specimen taken May 16, 1920, at Arlington, Mass., was received from C. A. Frost. A European species known in this country heretofore only from Nantucket, Mass., and Long Island, N. Y.

691. *Ceutorhynchus squamatus* Lec.

A single individual was taken June 25, while sweeping herbage in a dense woodland near Broad Ripple, Marion Co., Ind. The first record for the State.

695. *Ceutorhynchus pauxillus* Dietz.

Specimens have been received from F. S. Carr, who took them in August near Edmonton, Alberta. Known heretofore only from Illinois and New Mexico.

698. *Ceutorhynchus semirufus* Lec.

Several examples were secured, May 8, by sweeping the flowers of a water-cress, *Roripa americana* Gray, along the borders of a pond in Marion Co., Ind. Known from the State heretofore only from Lake and Steuben counties on the northern border.

707. *Dietzella* (*Cælogaster*) *zimmermanni* (Gyll.).

Leng in his Catalogue has adopted the generic name *Dietzella* Champ. (referred to in a footnote on p. 454 of the Rhynchophora) for this species and *C. lituratus* Dietz.

711. *Pelenomus sulcicollis* (Fahr.).

Two specimens were swept, December 1, from low shrubs in open pine woods near Dunedin, Fla. Not before recorded south of Georgia.

718. *Mecopeltus scandens* Dietz.

This species was found by C. A. Frost, July 10, in flood debris at Paris, Maine. Definitely recorded heretofore only from New Jersey and Virginia.

***Phyrdenus conotracheloides* new species.**

Oval, robust. Dark reddish-brown, thinly clothed with short yellowish and fulvous prostrate hairs which are condensed in a small spot near each hind angle of thorax, and on humeri and base of third intervals of elytra, also forming a vague wide band behind the middle of elytra and a ring at apical third of each femur. Beak as long as thorax, stout, feebly curved, striate, rather finely and closely punctate. Antennæ inserted at apical fourth, second joint of funicle slightly shorter and more slender than first, one half longer than those which follow. Thorax but little wider than long; sides feebly rounded; disk distinctly constricted at apical fourth, coarsely, densely, shallowly punctate; ocular lobes large, in repose almost covering the eyes. Elytra at base two thirds wider than thorax, sides gradually converging from basal third to apex; third, fifth and seventh intervals elevated and subcarinate nearly throughout their length, ninth carinate on basal half, the carinæ separated by two rows of coarse round, rather distant stria punctures. Under surface coarsely and sparsely punctate; third and fourth ventrals each one half shorter than second or fifth; pectoral groove very deep, extending beyond middle of mesosternum; tibiæ short, stout, curved at base, each with a short curved, tapering spur at tip. Last ventral with a wide median impression. Length 3.5-4 mm.

Taken in some numbers at Chokoloskee, Fla., March 11-15, where it occurred near the beach on saffron plum, *Bumelia angustifolia* Nutt., in company with *Conotrachelus floridanus* Fall and *C. maritimus* Blatch. It is a very aberrant form, resembling so closely several species of the genus *Conotrachelus* that I at first placed it as a member of that genus, but Mr. Fall, to whom I sent a specimen, wrote that it was a *Phyrdenus*, and the very deep pectoral groove and mucronate tibiæ place it there, though it lacks the sulcate tuberculate thorax which characterizes our other members of that genus. The elytra in some specimens are vaguely maculate with small piceous spots.

**732. *Conotrachelus affinis* Boh.**

One specimen was taken in Posey County, Ind., Sept. 27, while sweeping. Not before known from the State.

**749. *Conotrachelus tuberosus* Lec.**

During the past two summers numerous examples of this little species have been swept from nettles in dense woodland in Marion County, Ind. These are the first ones taken in the State.

**754. *Conotrachelus hispidus* Lec.**

A specimen taken at Ripley, Tenn., March 20, was sent me by



Marcovitch. Known heretofore only from the District of Columbia and Georgia.

767. *Tyloderma fragariae* Riley.

An example of this species was also received from Marcovitch, who took it at Knoxville, Tenn. Not before known south of the District of Columbia.

775. *Lembodes solitarius* Boh.

This bizarre Cryptorhynchid was quite frequent at Caxambus on Key Marco, and at Chokoloskee, Fla. At the latter place it was often beaten from the foliage of the sea grape, *Coccolobis uvifera* L., in company with *Pseudomus inflatus* Lec., the latter being the most common beetle taken on the island.

783. *Acalles inflatus* Blatch.

Three specimens were swept from low shrubs along the woodland slopes of White River, in Marion Co., Ind., August 6, Sept. 4. But two were previously known from the State.

791. *Acalles minimus* Blatch.

This was found to be a frequent form on the dead branches of trees at Chokoloskee, Fla., in early March.

*Acalles sablensis* Blatch.

A single specimen was beaten from a mass of dead vines at Chokoloskee, March 15. The only two previously known were from Cape Sable.

801. *Cryptorhynchus tessellatus* Blatch.

Several additional specimens of this form have been taken at Dunedin. All are larger than typical *bisignatus* and have the ochreous scales predominating both above and beneath, closely covering all the legs and forming ill-defined rings on the femora. The beak is stouter and the eyes more protuberant and more coarsely faceted than in *bisignatus* Say. As no intermediate specimens have been found it is probably a distinct and valid species instead of a variety of *bisignatus* as described on p. 509 of the Rhynchophora. It occurs in March and April on the dead branches of the wax-myrtle, *Cerothamnus ceriferus* (L.); also at porch light.

803. *Cryptorhynchus lapathi* Linn.

At the time of the writing of the Rhynchophora this large introduced species was not known from Indiana. It has since been taken in some numbers near Indianapolis on willow. One specimen is also at hand from Douglas, Mich.

814. *Cryptorhynchus oblongus* Lec.

Several specimens of this prettily marked weevil have been taken at Lakeland and Cape Sable, Fla. It hibernates in branches of Spanish moss.

822. *Dryotribus mimeticus* Horn.

More than 100 specimens of this little subarctic weevil were taken at Caxambus, Fla., on March 9. They, and about an equal number of the Tenebrionid, *Alphitobius piccus* (Oliv.), were found beneath two short pieces of decaying lumber near the ruins of an old sugar furnace, about one fourth of a mile from the beach.

834. *Macrancylus linearis* Lec.

This very slender maritime species has been taken in numbers in recent years at Dunedin, Ft. Myers, Cape Sable and Key West, Fla. It occurs in small colonies beneath old lumber lying just above high tide along the beaches and tide-water streams.

835. *Stenancylus colomboi* Casey.

Occurs on the foliage of the Florida button-wood, *Conocarpus erecta* L. Taken in December on several occasions at Hog Island, opposite Dunedin, by beating this shrub.

351. *Pentarthrinus atrolucens* Casey.

This species occurs rarely about Dunedin, Fla., two specimens having been taken, December 20, January 20, by beating the dead leaves of cabbage palmetto. Known heretofore only from Enterprise and Biscayne Bay, that State.

*Pentarthrinus brevisrostris* new species.

Elongate, subcylindrical. Piceous, shining; antennæ, apical half of beak and tarsi reddish-brown. Beak shorter than head, somewhat widened and flattened beyond the antennæ, both it and head minutely alutaceous, finely

and rather sparsely punctate. Thorax subcylindrical, slightly longer than wide, sides broadly rounded, disk feebly constricted and smooth near apex, elsewhere finely punctate, the punctures separated by nearly their own diameters. Elytra one half wider at base than thorax, sides parallel for three fourths their length; striae punctures fine, close-set; intervals very narrow, convex. Abdomen finely, very sparsely punctate, the second segment twice as long as third and fourth united; front coxae separated by nearly one half their own diameters. Length 2 mm.

Two specimens taken at Cape Sable, Fla., February 20 by beating dead limbs of buttonwood. Belongs under *aa* of the key on p. 54 of the Rhynchophora, and allied to *anonus*, but smaller with beak shorter, thorax, much more sparsely punctate and fore coxae more widely separated.

***Metamesius mosieri*** Barber, Proc. Ent. Soc. Wash., 1920, 157.

One specimen beaten February 21 from dead branches in a hammock at Cape Sable; another from cabbage palmetto at LaBelle, Fla., February 27. The types were from Cayamas, Cuba and Paradise Key, Fla. A very handsome tropical weevil, 6.5–9 mm. in length, black, with the front and hind margins of thorax, the basal half of elytra and the metasternum bright red; the elytra each with a round black spot in front of middle. The genus *Metamesius* Horn is distinguished from its congeners by having the front coxae widely separated, and third joint of tarsi very broad and densely pubescent beneath.

**878. *Sphenophorus marinus*** Chitt.

An example of this small Calandrid, taken at St. Augustine, Fla., Nov. 8, by G. P. Engelhardt, has been received from Chas. Schaeffer. Known heretofore only from New Jersey. Chittenden, in the notes following his original description, says that it is the "smallest *Sphenophorus* occurring in the United States," but I have specimens of both *S. parvulus* Gyll. and *S. minimus* Hart, which are smaller than the Florida example of *marinus*.

## A NEW GENUS AND SPECIES OF WEEVIL FROM TEXAS (COLEOPTERA).

BY HOWARD NOTMAN,

BROOKLYN, N. Y.

The species here described was sent to the author for identification by Dr. E. Porter Felt, New York State Entomologist.

### Genus *Zeugonyx* new genus.

Beak slender, cylindrical, about as long as the head and thorax, slightly arcuate; antennal scrobes beginning slightly behind the middle; scape reaching the eye, funicle four jointed, first and second elongate, third and fourth subglobular, club with the three joints well separated. Eyes moderately separated. In profile the beak is separated from the head by a distinct constriction. Thorax transverse, strongly narrowed anteriorly, basal margin finely elevated. Scutellum not distinct. Elytra convex and oval, scarcely wider than the thorax at base; base with a fine elevated margin. Legs of moderate length, femora stout, toothed, tarsi rather large, claw joint nearly as long as the three preceding together, claws of unequal length and nearly completely joined so that the shorter inner claw appears as a tooth on the larger outer one. Second abdominal segment longer than the third and fourth united; sutures straight. Intermediate coxæ rather broadly separated. Intercoxal process of the first ventral segment rather broadly rounded at apex.

This genus is closely related to *Nanophyes* Schoen. It differs from the various groups of that genus by the four-jointed antennal funicle and loosely articulated club; also by the unequal claws which are nearly completely joined. Lacordaire states (Gen. Col., VI, p. 618) that the claws are unequal in the males of *Cionus*, the outer being the shorter, however. The scutellum is present in *Cionus*.

According to Lacordaire the antennæ in *Nanophyes* are inserted between the middle and the apex of the beak but Brisout de Barneville in a later monograph (L'Abeille, VI, pp. 305-352, 1869) includes species in which the antennæ are inserted at or slightly behind the middle. The only species of *Nanophyes* at present at hand are single specimens of *N. telephii* Bedel and *N. pallidulus* Grav. They both differ from the described genus in the form of the head in profile, the beak being scarcely at all distinct from the head at base.

*Zeugonyx sabinæ* new species.

Form convex, oval, scarcely elongate. Color head, thorax, legs and sterna blackish piceous, beak at apex and the claw joint of the tarsi, slightly or scarcely paler, elytra and abdomen pale testaceous, the fine raised basal margin of the elytra blackish. Pubescence rather long, dense and coarse, whitish. Head scarcely one half the width of the thorax at base, feebly punctured and alutaceous. Beak polished, shining, with a row of coarse and feebly canaliculated punctures either side and some scattered punctures medially, without lateral carinæ. Antennal scape reaching the middle of the eye, club longer than the funicle, basal joint small, well separated, not much larger than the fourth funicular joint. Thorax conical, a third wider than long, the sides straight and strongly convergent anteriorly, surface rather indistinctly punctured and alutaceous, basal margin beaded. Elytra a little wider than the thorax at base, about a third longer than wide, humeri rounded, not distinct, apices separately rounded, deeply and coarsely striate, striæ coarsely but rather indistinctly punctate, intervals with rather indistinct punctuation. Femora with three fine and very acute teeth near the apex beneath. Length 2.5-2.75 mm.: width 1.5-1.65 mm.

Type, Austin, Tex., Mar. 29, 1919 (Collection New York State Museum, Albany, N. Y.).

Paratype, Austin, Tex., May 1, 1919 (Collection National Museum, Washington, D.C.).

Both specimens were bred from "oval twig swellings on mountain cedar, *Sabina sabinoides*, collected at Austin, Tex., by Mr. J. M. Del Curto, March 15, 1919."

It is known that a number of the European species of the related genus *Nanophyes* produce galls on various plants. Species of *Nanophyes* have been described from Europe, Asia, Africa, the East Indies and Australia. One has recently been described from Cuba (*N. dispersenotatus* Pic., Melanges, 19, p. 14).

The author is indebted to Mr. E. A. Schwarz for assistance in placing this species with its nearest relatives and for the loan of specimens of two species of *Nanophyes* for comparative study.

Wollaston suggests that the loosely connected basal joints of the antennal club in the species of *Nanophyes sensu strictu* should be regarded as part of the funicle since annulations are occasionally discernible in the terminal joint which might represent the usual three-jointed club (Col. Hesp., p. 125).

## NOTE ON LUTEVA CAROLINA H. S. (HEMIPTERA-HETEROPTERA. FAM. REDUVIIDÆ).

BY H. G. BARBER,

ROSELLE, N. J.

I can find no evidence that the real *Luteva carolina* has been found since its original description. The specimen referred to by me as *Ploiaria carolina* (Bull. Am. Mus. Nat. Hist., XXIII, p. 502, 1904) though placed by me in the wrong genus may have been correctly named as such. Since Mr. Sleight's death his collection is not very accessible, so that point will for the present have to remain in doubt.

While collecting, in company with Mr. William T. Davis, about Wilmington, North Carolina, in April, 1916, we found a number of adults and nymphs of what I take to be *Luteva carolina*, under some boards. In examining the literature concerning the genus *Luteva* I found not only considerable variation in the character of the fore leg in the included species but also some disagreement among authors on the interpretation of certain characters in the same species.

In *Luteva carolina* the anterior tibia and tarsus taken together are equal in length to the femor, the apex of the tarsus just attaining the apex of the trochanter. The trochanter is armed with two spine-like bristles of unequal length, similar in size and character to those of the fore femora. The femora are armed with a double series of spine-like bristles—an inner series of close set smaller ones and an outer row of six or seven longer ones along the basal two thirds. Alternating with these longer spines are two or three shorter ones. The anterior tarsus is composed of three rigid, connate segments and uni-unguiculate in both sexes. My specimens agree fairly well with Herrick-Schaeffer's figures, but it should here be pointed out that in fig. 936 the citations are incorrect—fig. *c* is the fore leg of *Emesa* and fig. *g* pertains to *Luteva*.

Dr. Bergroth (Psyche, XVIII, p. 19, 1911) points out that Mr. Banks has wrongly placed his *Luteva arizonensis* and *Placaria carolina* and notes some of the characters of *Luteva*. In my opinion *Luteva arizonensis* Banks should be placed in the genus *Westermania*, apparently distinct from any other known Mexican species.



## MISCELLANEOUS NOTES AND RECORDS OF LOCAL LEPIDOPTERA, AND DESCRIPTION OF TWO NEW ABERRATIONS.

BY FRANK E. WATSON,  
NEW YORK, N. Y.

### BUTTERFLY COLLECTING IN THE VICINITY OF NEW YORK CITY FOR THE SEASON OF 1920.

The exceedingly poor butterfly collecting in the vicinity of New York City this past season may perhaps be laid to the abnormal weather conditions, particularly to the greatly reduced amount of spring-like weather through March, April and May. Following a long cold winter, March was warm and spring-like from the middle to the end of the month. It also had a remarkable number of clear days for that month in this vicinity. April gave us just five nice warm spring-like days. May was better with nineteen warm days, and being steadily warm after the 14th. The weather, during June, was normal. July and August were exceedingly hot, humid and rainy. When not actually raining it was damp and cloudy with rain threatening, so that there were few sunny days during these two months.

*Cornus mass*, a European Dogwood, produced its first flowers on April 1st in St. Nicholas Park, New York City. The same shrubs last year flowered for the first time on March 18, *i.e.*, two weeks earlier. With the butterflies, at any rate, the season has apparently been about two weeks late, not becoming normal until about August 1st.

In Van Cortlandt Park, New York City, commencing with August 1 and lasting through the month and to about September 7, about sixteen of our commonest butterflies were very abundant and many of the less common species were observed. Prior to August 1st there was almost no collecting, while after September 7 the collecting became very poor again.

At Lake Mashipacong, Sussex Co., N. J., July 3 to 5, Mr. G. C. Hall and the writer enjoyed the hospitality of Mr. and Mrs. C. L. Robinson. Thirty-one species and four varieties were observed on the three days, among which were *Melitaea harrisii* Scudder, quite

common but many specimens poor, and *Euphyes bimacula* (Grote and Robinson), rather common, all males, just coming out on the 5th.

At Jamesburg, Monmouth Co., N. J., August 29, with Mr. C. L. Lewis, thirty-two species and one variety were noted. This is my best butterfly list (for one day) of the season. Worthy of special mention are—a single fresh male of *Poanes zabulon* (Boisduval and Le Conte); *Megistias fusca* (Grote and Robinson), two individuals; *Pamphila leonardus* (Harris), about fifteen to twenty seen, very difficult to capture; *Catia otho egeremet* (Scudder), about six old specimens captured (late record).

*Eurymus philodice* (Godart) has been, as it usually is, very common but its dichromatic female form *pallidice* Scudder was rather scarce.

*Correction*.—The note on page 343 in "Miscellaneous Collecting Notes for 1919"<sup>1</sup> should read, *E. philodice* is commoner than it was during 1917 but is by no means in its normal abundance.

*Danaus archippus* (Fabricius) has been, like last season,<sup>1</sup> nearly absent, only five individuals (listed below) being seen by me or brought to my attention and no eggs or larvæ were found.

One specimen at Parsippany, Morris Co., N. J., June 27 (G. C. Hall).

One old female near Van Cortlandt Park, New York City, August 3 (H. Mills).

One individual, Van Cortlandt Park, August 18.

One specimen, Mastic Beach, Long Island, New York, September 20 (J. T. Nichols).

One specimen near The American Museum of Natural History, October 11.

I have always considered this species one of our commonest local butterflies and I cannot recall a season, those of the present and preceding years excepted, when it was not plentiful. This being a migratory species, perhaps some catastrophe occurred to the migrating swarms, such as has been recorded for migrations of birds and certain mammals.

*Vanessa virginiensis* (Drury): one individual taken at Garden City, Long Island, New York, on the morning of November 21 by J.

<sup>1</sup> Miscellaneous Collecting Notes for 1919. Watson, F. E., JN. N. Y. ENT. SOC., 1919, XXVII, p. 343.

T. Nichols. It was sluggish when found on the top of a dead dry weed.

*Vanessa cardui* (Linné) has been with us again this season but was scarce.

*Basilarchia archippus* (Cramer): correction. On p. 343, l. 6, in "Miscellaneous Collecting Notes for 1919,"<sup>1</sup> *D. archippus* should read *B. archippus*.

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***Pieris napi virginiensis* Edwards.**

Following the Barnes and McDunnough Check List of Lepidoptera, 1917, this butterfly is here given as a race of *Pieris napi* (Linné). I am inclined to think that this may be a distinct species, for among other things, it seems to have but one generation a year, *napi oleracea* (Harris), the more northern insect, having two.

The name *virginiensis* has not heretofore appeared in any of our local lists, specimens recorded as *napi* (Linné) or *oleracea* (Harris) are probably of this form. As this is a very rare butterfly in the vicinity of New York City, records from the following specimens, which I have examined, may be of value.

Good figures of *virginiensis* are given by W. H. Edwards in his Butterflies of North America, Vol. I, 1871, Pl. IX, Figs. 5-8.

One female, in fair condition, Paterson, Passaic County, New Jersey, May 6 (J. A. Grossbeck); in the collection of The American Museum of Natural History. This specimen is recorded as "*P. oleracea* Bdv." on p. 417 of Report New Jersey State Museum—Insects of New Jersey (1909), 1910, by J. B. Smith. It was probably taken in the vicinity of Garrett Rock (Watchung Mountains).

One female, in poor condition, Watchung Mountains, New Jersey, May 6, 1900 (W. D. Kearfott); in the collection of The American Museum of Natural History. A pencil label attached to the specimen says "Garrett Rock," so that this individual was probably captured in the same general region where the preceding and following butterflies were taken.

One male, in good condition, Watchung Mountains, between Paterson and Great Notch, Passaic County, New Jersey, April 30, 1905 (F. E. Watson); in author's collection.

One old male, Blairstown, Warren County, New Jersey, June 2, 1920 (A. B. Klots); in the collection of A. B. Klots.

*Argynnis aphrodite alcestis* Edwards.

On page 45 of the Bulletin of the Brooklyn Entomological Society, 1913, Vol. VIII, is recorded the capture of a specimen of *alcestis* Edwards in Van Cortlandt Park, New York City. As two races cannot occur in the same region, this specimen should be reduced in rank to an aberration of *A. aphrodite aphrodite* (Fabricius). While it is practically identical in appearance with *alcestis*, its blood relationship is with *aphrodite* and *alcestis* should not be considered one of our local entities.

*Brenthis bellona* ab. *kleenei*, new aberration.

This aberration differs from typical *bellona* (Fabricius), in having the entire area of both wings black from the base to just inside the extra-mesial series of round black spots. On the primaries there is a distinct subquadrate spot of fulvous near the center, and an obsolete line (scarcely discernible) of the same color at the end, of the cell. There is a dusting of fulvous scales at the base, extending along the costa to nearly the middle of the wing and along the inner margin to the fulvous terminal area. The extra-mesial series of spots is greatly reduced, the upper three being obsolete, the two between veins 2 and 4 are strongest. The geminate submarginal band is practically obsolete. The outer series is reduced to a slight dusting of black scales on the veins and the inner row to a series of four faint rounded spots between veins 2 and 6. This series of spots is also closer to the extra-mesial series than in normal individuals. Secondaries with an obsolete (scarcely discernible) fulvous line at the end of the cell. The spots of the extra-mesial series are all present but smaller than normal. The submarginal series of elongate spots is also present but reduced and somewhat suffused, and together with the marginal series of T shaped spots (which are also suffused) forms an indistinct blackish marginal band. This band merges with the black basal area at the apex. Fringes of both wings blacker than normal. Underside of primaries similar to upper but with the addition of a small distinct fulvous spot at the base, and an obsolete line before the distal end, of the cell. There is also a faint fulvous streak below vein 2 near the base. The deep cinnamonous marginal border is interrupted by a yellowish apical patch and obsolete patches of the same color between veins 3 and 5. Underside of secondaries with the area, which was black above, chestnut, except as follows. A yellow bar along the precostal vein. A large lilacinous patch at base of cellule 7-8, acuminate distad along vein 8 and terminating near the center of the wing. This patch encloses near its base a round chestnut spot. A mesial series of four yellow annuli, the first between veins 1a and 1, second and third between 1 and 2, and fourth at distal end of cell between 3 and 5, the middle discocellular forming its outer edge. This, the fourth,

annulus is less well defined than the others and it has a horizontal lilac streak on its lower edge extending distad to the outer edge of the chestnut area. The chestnut area is also interrupted by blackish patches near the bases of cellules 2-3, 3-4, and 4-5, the last being obsolete. The brown distal area is overlaid with iridescent violet scales. The brown submarginal crescents and extra-mesical annuli are present but more obscure than in normal individuals. Fringes of both wings blacker than normal.

Expanse—43.5 mm.

This is a black *bellona*, with a fulvous terminal band on the primaries about 4 mm. wide and a subterminal band of the same color on the secondaries, about 2.5 mm. wide.

This beautiful aberration was captured by Mr. S. Kleene, after whom it is named, at West Hartford, Connecticut, May 3, 1921.

Holotype, female, in the collection of The American Museum of Natural History; donated by Mr. S. Kleene.

#### *Aglais antiopa* (Linné).

A patch of eggs was found by me on the underside of a willow leaf at Tappan, Rockland County, New York, Aug. 4, 1918. They covered nearly the basal third of the leaf extending to the edges and down to the petiole. It is somewhat unusual to find eggs of this species on a leaf as they generally encircle a terminal twig.

#### *Poanes hobomok* ab. *pallida*, new aberration.

This aberration differs from typical *hobomok* (Harris) in having the usual dark brown borders and markings of all wings, above and below, light gray and the normal bright tawny areas and spots on both wings above and on primaries beneath pale dull tawny. Secondaries beneath with the band and subbasal spot light dull yellow. Fringes of both wings above and below grayish.

Expanse—31 mm.

Holotype, male, near Dunwoodie, Westchester County, New York, May 21, 1921 (F. E. Watson); in the collection of The American Museum of Natural History.

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### BOOK REVIEW.

APPLIED ENTOMOLOGY. AN INTRODUCTORY TEXT BOOK OF INSECTS IN THEIR RELATIONS TO MAN. By H. T. FERNALD, PH.D., pp. i-xiv, 1-386, 388 figs. McGraw-Hill Book Company, Inc., New York, 1921.

The scope of the book is well stated in the preface, where we read that it is "offered as a classroom text for an introductory course in the subject, which shall give a general idea of insects, their structure, life histories and habits, with methods for the control of insect pests in general, followed by a more thorough study of the more important ones found in this country."

Sixty-one pages are devoted to the consideration of the structure and development of insects, to the losses caused by them, to general methods of control both natural and artificial, and to their relationship one to another. In the following 313 pages the twenty-four orders into which the class is divided are considered, and with the exception of the Thysanura and Collembola, a chapter is devoted to each. The structural characters of each of the orders are given, and any particular offender, or group of offenders, against the interests of man, are dealt with in a paragraph labeled "Control." Numerous illustrations, many of which are original, also serve to locate the insect about which information is sought.

The book is recommended as one of the best works on the subject. On the title page we read "first edition," and we think that the coming years will see many more.—WM. T. DAVIS.

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## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

### MEETING OF NOVEMBER 1.

A regular meeting of the New York Entomological Society was held at 3 P.M., on November 1, 1921, in the American Museum of Natural History, vice-president Harry B. Weiss in the chair, with 23 members and 5 visitors present.

Mr. Tee-Van spoke of the "Insects about the Tropical Research Station at Kartabo, British Guiana" with lantern slide illustrations and five boxes of specimens of Lepidoptera and other insects. He described the station as conveniently located at the junction of the Mazaruni with the Essequibo river, where the trade winds blowing across the five mile wide stretch of water kept it cool. Within the radius covered by the operations of the station the flat coastal plain, the rolling foothills and the high plateau were all found and each yielded different insects. The station which was established by Wm. Beebe in 1916 has been repeatedly visited by Mr. Tee Van since that time with many interesting experiences. *Peripatus* and its young, shown in one of his pictures, was comparatively common; *Morphos* attracted by pieces of blue paper, groups of Anthomyids sleeping together, 200 Pierids on a space of mud two feet square, were other interesting observations. As instances of the extraordinary richness of the fauna, Mr. Tee Van mentioned 451 species of birds found within two square miles, 93 species of ants on one tree, 800 species of Lepidoptera already recorded. The



remarkable migrations of butterflies was another topic on which he dwelt, the vast number involved on one occasion resembling a snow storm of yellow flakes crossing the river. The great buprestid beetle *Euchroma gigantea* was another common sight about the station; the great *Sphex* wasp found nesting in a tree by Prof. Wheeler, one of the interesting discoveries in life habits; the hand rails and bridges built by army ants, one of the remarkable features of the insect life.

Mr. Tee Van was followed with close attention and his remarks were discussed by many of the members at the close of his lecture.

Mr. Woodruff exhibited a green roach (*Panchlora cubensis*) introduced from Cuba with bananas. Dr. Bequaert showed a female specimen of the fossorial wasp *Iodius*, taken by him at Plummer's Island, near Washington, D.C., and passed in review the habits of the fossorial wasps of the sub-family Spheginae.

Mr. Wm. T. Davis referred to the fly *Cuterebra buccata* from Staten Island, shown by him at the meeting of October 4, and stated that recently he had been presented with a female *Cuterebra cuniculi*, also from Staten Island, and collected by Mr. John W. Angell in the Clove Valley in June, 1921. This specimen was exhibited. He also showed two female *Cuterebra fontinella* collected in August, 1921, in Martha's Vineyard, Mass., by Mr. Frank Morton Jones, of Wilmington, Delaware, who wrote that he had seen a third specimen in a spider's web, and that some years ago he had taken another on the Island, which had been presented to Mr. Cresson of Philadelphia. All were from the wooded portion of the Island, between Vineyard Haven and West Chop.

#### MEETING OF NOVEMBER 15.

A regular meeting of the New York Entomological Society was held at 8 P.M., on November 15, 1921, in the American Museum of Natural History, President John D. Sherman, Jr., in the chair, with 21 members and seven visitors present.

Dr. Lutz spoke on "Some Papers on the Color Vision of Bees" pointing out a defect in practically all the 5,000 papers cited in Knuth's *Biology of Flower Color*, in that the colors were not measured by their wave length. He gave some interesting figures showing the number of miles traveled by bees in accumulating a pound of honey based on a statement published that to get a pound, 62,000 flowers had to be visited. He then passed to the apparently contradictory results of experiments conducted to show whether or not bees showed a preference for blue flowers. The experiments of Plateau & Rey and of von Friesch and von Hess were especially mentioned, as indicating that relative luminosity, rather than actual color as known by the human eye, might be the controlling factor. Dr. Lutz also spoke of the origin of flower colors, with which the vision of bees and other insects has been theoretically connected as being concerned in the general problem. Dr. Lutz's remarks were freely discussed by many of

those present. Mr. Davis testified that bees are attracted by the artificial flowers prepared by milliners; Mr. Tee Van's evidence that butterflies at Tropical Research Station were attracted by pieces of blue paper was recalled; Mr. Engelhardt maintained that the principal honey producing flowers are light colored, not necessarily blue however. Mr. Davis pointed out the attraction of sap, sugar and poplar glands, which display no color.

Dr. Bequaert spoke at some length on the importance of the shape of the flower with which he believed the insects became acquainted. He gave instances of their display of intelligence in biting holes to get at the honey; and of their efficiency in reaching within flowers of intricate build. He thought that as color is accidental in minerals, so it might also be in flowers.

Messrs. Angell, Sherman, Notman, Barber, Sturtevant, Marchand and Medsger also contributed to the discussion.

#### MEETING OF DECEMBER 6.

A regular meeting of the New York Entomological Society was held at 8 P.M., on December 6, 1921, in the American Museum of Natural History, vice-president Harry B. Weiss in the chair, with 15 members present.

Mr. Mutchler proposed Dr. E. R. P. Janvrin, 515 Park Ave., for active membership.

On motion, duly seconded and carried, the by-laws were suspended and Dr. Janvrin was immediately elected.

Mr. Notman read a paper on "Coleoptera collected at Westfield, N. Y.," illustrated by the 384 species he found there, of which 22 were described as new, and 2 required the erection of new genera. Westfield is near the shore of Lake Erie and the mouth of Chatauqua Creek. With the aid of topographical survey map Mr. Notman showed the remarkable ravine in which much of his collecting was done, as well as the long littoral line of lake front, where he had also collected. The large number of new species found was, however, the result of close study of minute and obscure forms rather than that of local environment; Mr. Notman considering the general character of the collection much like what would be found in the rest of New York State. Among the most interesting captures were a specimen of *Pelenomus griseus*, possibly the second known, a long series of *Bactridium ephippigerum* found under small fragments of bark still adhering to an almost denuded log, and *Nicagus obscurus*, found on the sandy banks of the creek.

Mr. Notman was complimented on the rare combination his work displayed of skilful collecting, fine mounting and patient study.

Mr. Davis after exhibiting Dr. H. T. Fernald's "Applied Entomology" read a paper "Remarks on the Cicadas of Virginia" illustrated by specimens of the 14 species and 2 varieties found in the State. Among the incidents connected with his studies of these Virginia Cicadas he mentioned the holidays

spent with Col. Wirt Robinson, (to whom the new species shown was dedicated), a parcel of 51 dead or dying individuals found by Colonel Robinson after a cold night and a record resulting from a Cicada coming in through an open train window.

Mr. Weiss showed two cases of insects imbedded in the fungus *Fomes applanatus*, one being a Cicada pupal shell, the other a beetle, *Boletotherus bifurcus*, which was still alive when found.

#### MEETING OF DECEMBER 20.

A regular meeting of the New York Entomological Society was held at 8 P.M., on December 20, 1921, in the American Museum of Natural History, President John D. Sherman, Jr., in the chair, with 14 members present.

Commendatory letters re JOURNAL were read.

The librarian's report was filed.

The president appointed a nominating committee, Messrs. Notman, Dickerson and Quirsfeld.

A newspaper illustrated item re A. C. Weeks was shown.

Mr. Notman mentioned that a collection of 1200 species of Centoniinae was for sale, of which particulars might be had at United States National Museum.

Mr. Sherman gave some notes from a recent visit to Washington.

Mr. Weiss read a paper which will be published in full on "Benedict Jaeger, an early entomologist in New Jersey" illustrated by examples of his works.

Mr. Nicolay under the title "Beetling in the White Mts." gave an interesting account of his visit to that locality with Frank R. Mason last June, when at the summit high winds and low temperature caused much discomfort. Some of the beetles collected, especially the Cychrini, were shown. The most remarkable catch was *Nomaretus bilobus* of which several specimens were found under loose bark of fallen trees near the tree line.

Mr. Davis called attention to the work of R. E. Snodgrass on "The Seventeenth-year Locust," being Publication 2607 from Smithsonian Report for 1919, pp. 381-409, with five plates.



# JOURNAL

OF THE

## New York Entomological Society.

Published quarterly by the Society, at Prince & Lemon Sts., Lancaster, Pa., and New York City. All communications relating to the JOURNAL should be sent to the Publication Committee, New York Entomological Society, American Museum of Natural History, New York City; all subscriptions to the Treasurer, Wm. T. Davis, 146 Stuyvesant Place, New Brighton, Staten Is., New York, and all books and pamphlets to the Librarian, Frank E. Watson, American Museum of Natural History, New York City. Terms for subscription, \$2.00 per year, strictly in advance. *Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY*

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Organized June 29, 1892.—Incorporated June 7, 1893.

Annual dues for Active Members, \$3.00.

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JOURNAL  
OF THE  
NEW YORK  
Entomological Society.

Devoted to Entomology in General.



DECEMBER, 1922. FEB - 8 1923

Edited by HOWARD NOTMAN

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Published Quarterly by the Society.

LANCASTER, PA.

NEW YORK CITY.

1922.

[Entered April 21, 1904, at Lancaster, Pa., as second-class matter under Act of Congress of July 16, 1894.]

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NOTICE:—VOLUME XXX, NUMBER 3 OF THE JOURNAL OF THE  
NEW YORK ENTOMOLOGICAL SOCIETY WAS PUBLISHED ON  
NOVEMBER 8TH, 1922.

# JOURNAL

OF THE

## New York Entomological Society.

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VOL. XXX.

DECEMBER, 1922.

No. 4

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### STRATIOMYIID LARVÆ AND PUPARIA OF THE NORTH EASTERN STATES.

BY O. A. JOHANNSEN,

ITHACA, N. Y.

For some years, I have collected, as occasion offered, the immature stages of Diptera and in this way have accumulated a number of the larvæ and puparia of the Stratiomyiidae, among which there are three genera, fourteen species in the last instar, and seven species in earlier instars which have not heretofore been described. As it may be of interest to entomologists I am offering here a key to the known early stages of genera and species occurring in the North Eastern States. In view of the number of additional forms included, I believe no apology is needed for publishing a paper on this subject so soon after the appearance of the excellent table included by Mr. Malloch in his work, published in 1917.

That there is secreted by the hypodermis of the larvæ of this family a heavy deposit of calcium carbonate has long been known. This deposit, which forms on all parts of the body, including the appendages of the head, is sometimes so thick and dense that it obscures the outlines of the more delicate parts and renders their study difficult and sometimes impossible. By dropping the insect in dilute hydrochloric acid for a moment, until the active effervescence ceases, the deposit is removed and the integument rendered beautifully clean. Placed in a 10 per cent. solution of caustic potash for 24 hours or until the darker mouth parts become pale, it can then be freed from the dissolved internal tissues, dehydrated, cleared and mounted in

balsam in the usual way. If care is taken to support the cover glass sufficiently the mount will not be distorted or compressed.

This paper is intended solely as a study in taxonomy, detailed figures of mouth parts are therefore not given. It is probably true that taxonomic characters may be found in them but without having a number of species within the same genus for comparison it would be difficult to determine upon what part the intensive study should be placed. This is particularly true in genera like *Stratiomyia* and *Odontomyia* each of which contains a number of species. Students interested in a study of the homologies of the mouth parts are referred to the most excellent paper of Prof. J. C. H. de Meijere (1916) as well as to the earlier work of F. Brauer (1883).

An interesting feature brought out in this study is the fact that in a number of details of structure, armature of body, and mouth parts, the earlier instars differ from the final one. In all larval stages the body bristles are for the most part spiculate and more or less flattened. In the European *Pachygaster atra*, and in the penultimate instar of *Microchrysa polita* they are also slightly clavate.

In the following key I have not indicated subfamily limits. Our knowledge of the early stages of this family is still too fragmentary to attempt broad generalizations. *Xylomyia* is here included. Whether this genus is to be referred to the Stratiomyiidae or the Leptidae is still an open question. When emerging, the imago of the members of this genus withdraws the pupal skin, at least in part, from the puparium, while in the Stratiomyiidae the pupal skin remains wholly within it. Other characters of larvæ and adult also indicate Leptid affinities.

- A. Last abdominal segment with a tuft of soft plumose or pubescent hairs; aquatic or semiaquatic species.
- B. Caudal margin of the ventral side of at least the penultimate abdominal segment with a pair of stout, curved thorns or hooks; antennæ over three times as long as broad; body more or less striped.
- C. Antennæ placed at the latero-anterior angles of the head; no stout spines in a transverse row on the venter of each abdominal segment. .... **Odontomyia.**
- D. Species 20-30 mm. long; with a wide, paler, compound dorsal vitta made up of four pale and three brownish stripes; lateral margins dark; antennæ distinctly curved ..... **cincta.**
- DD. Species 16 mm. long or less.

- E.* A pair of hooks on ventral posterior margin of segment eleven only; tip of antenna produced almost as far cephalad as the beak. .... **Sp. A.**
- EE.* Hooks on venter of both segments ten and eleven.
- F.* One pair of stout hooks on ten and eleven.
- G.* Length of full-grown larva over 15 mm. .. **pilimanus.**
- GG.* Length of full-grown larva 12-15 mm. **vertebrata.**
- FF.* One pair of stout hooks on 11, four or more on 10.
- G.* Four hooks on 10; antennæ about four times as long as broad, tips produced beyond tip of beak .... **virgo.**
- GG.* Four hooks on 8, six on 9 and 10, and two on 11; antennæ stouter, not produced to tip of beak... **Sp. B.**
- CC.* Antennæ placed dorsally, remote from the margin; each abdominal segment except the last, before its middle on ventral side, with a transverse row of short, stout spines ..... **Euparyphus.**
- D.* Ventral hooks of penultimate segment large, over half as long as the segment itself; the last instar with anterior spiracles on elongate processes (figs. 5, 6, 7, 13, 15); length 9 mm. **brevicornis**
- DD.* Ventral hooks of penultimate segment much shorter.
- E.* Ventral hooks distinctly longer than the five straight, stout spines on the same segment; median process (beak) of the head not produced as far cephalad as the mouth parts (figs. 1, 4, 12); length 13 mm. .... **greylockensis.**
- EE.* Ventral hooks but little if any longer than the two straight, stout spines before the middle of the same segment (figs. 2, 3); length 10 mm. .... **tetraspilus.**
- BB.* No ventral hooks on the penultimate segment.
- C.* Posterior spiracular chamber on the dorsal side of the terminal segment, this segment emarginate and armed with four to six long marginal setæ; fringe of plumose hairs short, not, or scarcely produced beyond the markin of the segment (fig. 18). .. **Nemotelus.**
- CC.* Posterior spiracular chamber at the apex of the segment; hair fringe long.
- D.* Terminal abdominal segment not much longer than broad (fig. 21). .... **Oxycera.**
- DD.* Terminal abdominal segment much longer than broad.....  
**Stratiomyia.**
- E.* Terminal segment about five times as long as its width at base (fig. 9). .... **norma.**
- EE.* Terminal segment not over three times as long as its width at base.
- F.* Penultimate abdominal segment about three fourths as long as the terminal segment. .... **normula.**
- FF.* Penultimate segment about five eighths as long as the terminal segment. .... **meigenii.**

- FFF. Apical half of last abdominal segment cylindrical, instead of conical as in *normula* and *meigenii*; penultimate segment about .7 as long as the last. .... **discalis.**
- AA. Last abdominal segment without a tuft of plumose hairs; species living in dung, decaying vegetable matter, decaying wood, or bark or refuse.
- B. Each segment laterally with two lobes, the anterior one much narrower (figs. 40, 41); length 8.5 mm. In the penultimate instar the head is more tapering and the mouth parts simpler. .. **Allognosta fuscitarsis.**
- BB. Lateral margin not so lobed.
- C. Antennæ located on disc of head well back from the margin.
- D. Outer bristle of each dorsal transverse series of abdominal segments not more than one sixth as long as the next bristle; innermost bristle also short (figs. 19, 20). .. **Eupachygaster henshawi.**
- DD. Bristles very long, in transverse series, not so strikingly different in length (fig. 10). .... **Zabrachia polita.**
- CC. Antennæ located at or near the margin of the head.
- D. Antenna over three times longer than wide; yellowish species, incisures distinctly blackish, each segment marked with a small spot on each side and a larger median spot, the latter on the intermediate segments with clear space in the center; bristles very short; length of larva 8 mm. Not reared. (*Beris* or *Actina*?) ..... **Stratiomyiid I.<sup>1</sup>**
- DD. Antennæ short, last segment about as long as wide.
- E. "Eye" tubercles prominent, body more or less distinctly longitudinally striped; without numerous appressed scale-like hairs.
- F. Head broadest at base, tapering anteriorly, two more or less prominent tubercles on each side of head (figs. 27, 30); length 10 mm. .... **Macrosargus clavis.**
- FF. Head at least as broad at the tubercles as at the base.
- G. Width of head about two thirds that of its length; terminal abdominal segment with a distinct cleft, a short bristle on each apex (figs. 22, 24); length 8 mm.; penultimate instar with slightly clavate body bristles (fig. 23). .... **Microchrysa polita.**
- GG. Head nearly or quite as wide as long. **Geosargus.**
- H. Dorsum of body with two distinct longitudinal, pale, more or less zigzag stripes and pale lateral margins; head slightly longer than wide; anterior angle of eye tubercle not distinctly reëntrant (figs. 25, 33); length 10 mm. .... **decorus.**
- HH. Body with six distinct longitudinal, dark, zigzag stripes; head about as long as broad; anterior angle of eye tubercle reëntrant (figs. 26, 34); length 10 mm. .... **viridis.**

<sup>1</sup> See notes below, under Beridiinæ.



- HHH. Body usually with two indistinct, pale, irregular, longitudinal stripes, head slightly wider than long; anterior angle of eye tubercle strongly re-entrant (fig. 29); length 9 mm. . . . . **cuprarius**.  
EE. Eye tubercle not prominent except in *Hermetia*; body covered with more or less appressed scale-like hairs, except in *Neopachygaster* (fig. 8).

F. Body bristles slightly clavate; terminal abdominal segment slightly cleft; body usually striped, sometimes but faintly. Penultimate instar (fig. 23). **Microchrysa polita**.

FF. Not as above.

G. Head with stellate hairs (fig. 32). Penultimate instar.

**Geosargus A.**

GG. Head without stellate hairs.

H. Head only slightly longer than broad; antennæ situated distinctly proximad of the latero-anterior angle of the head. Penultimate instar. (fig. 35).

**Geosargus B.**

HH. Head noticeably longer than broad.

I. Eye tubercles distinct; antennæ situated distinctly proximad of the latero-anterior angles of the head; posterior margin of last abdominal segment slightly emarginate (figs. 38, 39).

**Hermetia illucens.**

II. Eye tubercles less distinct.

J. Antennæ situated at the apex of the latero-anterior angles of the head (penultimate instar of *Hermetia*? Fig. 36). **Stratiomyiid II.**

JJ. Antennæ situated proximad of the latero-anterior angles of the head.

K. Body with more or less appressed scale-like hairs and short bristles; head bristles short (fig. 31). Penultimate instar.

**Macrosargus clavis.**

KK. Body without appressed scale-like hairs, bristles stout, almost clavate (fig. 8a); the longer head bristles half as long as the diameter of the head.

**Neopachygaster maculicornis.**

KKK. Body without appressed scale-like hairs; differs from the foregoing in having on the disc of segments one and two a large transverse chitin plate instead of numerous small oval plates. . . **Xylomyia pallipes**.

### Pachygasterinæ.

The genus *Pachygaster* in its narrowest sense includes one North American species, *P. pulcher* Loew, which, though not common, appears to have a wide distribution. But little is known of its habits. The early stages of the European *P. atra* Meigen, the type of the genus, has been described by Heeger, and others. It has clavate body bristles like the penultimate instar of *Microchrysa polita* but lacks the cleft at the apex of the abdomen (fig. 16). Verrall states that the larvæ are found in rotten detritus of the elm. According to Heeger the larva hibernates under leaves and stones, the adults appearing in April in Central Europe. The eggs, six to ten in number, are laid in moist places on the earth, and hatch in eight to twelve days. The larva feeds on dead animal matter found in the mud, but may also feed on living earthworms and maggots. When full grown it is about 6 mm. in length. In from one to three months the adults appear, and may be found from April to September. It thus appears that there are two broods. The early stages of other European species are described by Lundbeck (1907), Verrall (1909) and others.

The larva of *Zabrachia polita* Coq. was found by Mr. C. W. Johnson (1906) under the wet, decayed bark of pine logs. It is 5 mm. long and brownish in color (fig. 10). The adults appear in May and June. Bezzi has referred the European *Pachygaster minutissima* Zett. (fig. 14) to the genus *Zabrachia*. The larva of this species which is found under the decaying bark of conifers is described and figured by de Meijere (1916) and Trägaardh (1914), as well as by earlier authors.

A specimen of *Zabrachia polita* was kindly lent me by Mr. C. W. Johnson for study. The head resembles that shown in figure 14 but the mouth parts are folded down so that they do not project forward. The line of articulation of these parts makes a distinctly acute angle with the longitudinal axis instead of being nearly a right angle and the bristles are also more numerous, some almost clavate. The antennæ are placed about as shown in the figure of *Z. minutissima* (fig. 14). Figure 10 is a ventral view of *Z. polita*. The dorsal bristles are longer and stronger than the ventral. On the first segment there are two transverse ranges but on each of the succeeding

segments but one, each with six long and strong bristles besides the still longer laterals.

The larva of *maculicornis* Hine, the North American representative of the genus *Neopachygaster* was described by Greene (1917) and also by Malloch (1917). Greene found larvæ in the early spring under the bark of the tulip tree. Malloch's specimens were obtained under the bark of fallen elm trees, where they were feeding on the decaying matter under the slightly loosened bark. They appear also to be carnivorous. The larva resembles the penultimate instar of *Microchrysa polita* but differs in lacking the appressed scale-like hairs, the cleft terminal segment of the abdomen, and in having the body bristles less distinctly clavate. My specimen was received through the kindness of Mr. Greene.

The larva of *Eupachygaster henshawi* Malloch was found by Malloch (1917) under the loose bark of an apple tree, feeding upon sap and upon insect larvæ.

The early stages of *Berkshiria albistylum* John. and *Johnsonomyia aldrichi* Malloch are as yet unknown.

### Clitellariinæ.

The genus *Euparyphus* is represented in eastern United States by several species, three of which I have reared. The larvæ of *E. brevicornis* were found in algæ and moss which grew on the sides of the rocks that bordered a brook, and were continually wetted by the running water. Some were also found in moss over which there was a trickling stream of water. Larvæ in all stages were found in May and June. Figures 5, 6, 7, 13 and 15 show the penultimate and last instars. In the first instar the curved thorns, so conspicuous in larger larvæ, are wanting, although their basal protuberances are in evidence.

The larvæ of *E. greylockensis* and *E. tetraspilus* were found in the water in overhanging vegetation growing on the margin of a brook. The former was collected in June, the latter in July. My bred specimen of *E. greylockensis* differs from the description of the type in having small lateral stripes on the fourth abdominal segment. It may deserve a varietal name.

I believe that the European *Oxyccera tenuicornis* Macq. should be

placed in the genus *Euparyphus*. It is also quite possible that the unreaired larva described by Haliday (1857) and doubtfully identified as *Oxyccera morrisii* belongs to *tenuicornis* instead.

Though the genus *Nemotelus* occurs in the eastern states, the larvæ of our species have not been described. Figure 18 represents the larva of the European *N. pantherinus*, which, according to Lundbeck, lives in water among plants. It hibernates as a larva and transforms the following spring or summer. Haliday (1857) states that the larvæ of *N. uliginosus* are common under dried-up algæ and other vegetable matter strewn on the ground especially in marshy spots on the shore. In all probability, however, it is only at time of pupation that they tolerate a dry situation.

Neither have the early stages of the North American representatives of the genus *Oxyccera* been described. Heeger (1856) figured and described the larvæ of two European species *O. Meigenii* and *O. trilineata*. The larvæ of *O. Meigenii* live in small brooks concealed in the ooze, coming to the surface in warm weather. In captivity they feed readily on roots of plants, bread crumbs, and dead earthworms. In the spring they creep into dry situations under stones and the like, to pupate. The full-grown larva measures 12 to 14 mm. in length. The flies emerge in July, laying their eggs soon after. The oval eggs measure 0.5 x 1.5 mm. Heeger's figure of *O. trilineata* is reproduced in figure 21. The larva of this species when full grown measures about 10 mm. in length. In habits it resembles the foregoing. Lundbeck, who also describes it, states that the larva lives in mud, and that the development of the imago takes place in spring or summer. The life histories of the other species of this subfamily represented in the fauna under consideration are unknown. These are *Akronia frontosa* Hine, recorded from Ohio, *Clitellaria subulata* Loew from Virginia, and *Scoliopelta luteipes* Will. from New Hampshire.

Since the foregoing paragraphs were written I have seen a specimen of each of the genera *Nemotelus* and *Oxyccera*, both taken from frog stomachs. These species differ only in specific characters from the European forms given in the keys. My specimen of *Nemotelus* has the posterior margin of the last abdominal segment slightly emarginate instead of notched.

### Stratiomyiinae.

The larvæ of several species of each of the genera *Stratiomyia* and *Odontomyia* have been described. Some of the European species have long been known. Lundbeck gives a key to several European species, while Hart (1895) and Malloch (1917) have dealt with the biology of several native forms. Of the species of these two genera mentioned in the foregoing keys I have not seen *O. vertebrata*, but have inserted it on the basis of Hart's description. It is quite probable that better diagnostic specific characters may be found than those which I have used. The poor condition and limited number of specimens of some of the species prevented my making use of minor characters which might prove important. The number of hooks on the venter may, indeed, not even be of specific value. The adult of the species which I have called Sp. B in the key very closely resembles the female of *O. virgo*. My reared specimen of *O. pilimanus* is a male; it differs from a typical specimen in having longer thoracic pile and a broader abdominal stripe.

All the specimens of both genera were collected in ponds or on their margins where the insects go to pupate. When about to pupate, or after pupation, they withstand drying out to a remarkable degree. Their food consists of decaying vegetable matter (or possibly the fungi growing in this), of algæ and other small micro-organisms.

The immature stages of *Nothomyia viridis* Hine are not known.

### Sarginae.

The genus *Gcosargus* is represented by four or five species in the Eastern States. A series of experiments by Dr. J. G. Needham, conducted for the purpose of producing an economical fish food, involved the cutting up of a quantity of the stems of succulent plants and other vegetable matter. This material became infested with the larvæ of a number of insects among which was *Gcosargus decorus*, adults emerging in August. I have also found this species, as well as *G. cuprarius*, in cow dung. The latter species was also bred by Prof. Britton (1915) of Connecticut from larvæ found on the earth, near strawberry crowns. In Europe it was bred by Westwood from garden mold, by Beling from decomposing heaps of

rotting weeds, by Bremi from cow dung, while Dufour states that he obtained it from ulcers in elms. My larval specimens of *Geosargus viridis* were found by the late Prof. M. V. Slingerland living in the richly fertilized soil of a potted green house plant. The specimens described by Malloch were obtained from cow dung.

Some larvæ found in cow dung, but not reared, when placed in caustic potash and later examined showed plainly through the integument the next succeeding instar. By careful manipulation it was possible to draw out the inner skin which proved to be quite similar to that of *G. viridis* making allowance for future expansion. The penultimate instar thus differs strikingly from the final instar, the depressed scale-like hairs being characteristic. The heads of these are shown in figures 32 and 37. This form is designated as Sp. A in the key.

Some larvæ closely resembling the foregoing but differing in the form and armature of the head (fig. 35) were found associated with the *G. decorus* larvæ in Dr. Needham's experiment. Their form, and body covering of depressed hairs indicate that they are the penultimate instars of *Geosargus*, and probably of *G. decorus*.

Figures 27 and 30 are details of the larva of *Macrosargus clavis* Will., while fig. 31 shows the head of its penultimate instar. Dr. P. W. Claassen discovered these larvæ living in the frass of the larva of *Arzama obliqua* which infests cattail stems. The earlier stage was found in July, the last instar in April and May, of the following year, adults appearing in May and June. There appears to be but one brood which hibernates as larvæ in the last instar. The penultimate instar has body markings similar to, but feebler than, the last instar; the latter lacks the appressed scale-like hairs which the former possesses.

The last two instars as well as bred specimens of the adult flies of *Microchrysa polita* were obtained in July by Dr. Needham from the vegetable matter used in the experiments above mentioned. I have also reared this species from cow dung. The form described by Malloch as "Genus *Incertus* 3" is without much doubt the penultimate instar of *M. polita*. This instar is usually marked in a similar manner to that of the last instar, though sometimes the pattern is but feebly indicated. European writers record the rearing of this species from cow dung and decaying vegetable matter.



The immature stages of *Ptecticus* and of *Chrysochroma nigricorne* are as yet unknown.

### Hermetiinae.

This subfamily is not recognized by Williston in his Manual. *Hermetia* being placed in the Clitellarinæ, while *Acrochata* and related genera are placed with the Sarginæ. I prefer the arrangement given by Kertész in his Catalogus Dipteriorum, as being the more natural.

Though *Hermetia illucens* has a southern range, it has been recorded as far north as New Jersey, and is therefore included in this paper. One of my specimens together with its puparium was given to me by Mr. L. H. Dunn, he having obtained the specimens from human carrion in Panama. The larvæ are said to be abundant in decaying vegetables and not uncommon in silos throughout the south. Malloch states that they are numerous in latrines.

Specimens of what I believe to be the penultimate instar were collected by Dr. J. C. Bradley in Georgia from a pile of decaying paper and other organic matter (fig. 36).

### Beridiinae.

The only larvæ of members of this subfamily which I have seen belong to the species *Allognosta fuscitarsis* Say. They were found in decaying organic matter associated with *Fannia scalaris*. The larva is more slender than the puparium (fig. 41). The penultimate instar differs in having a more tapering head and has numerous appressed scale-like hairs upon its body. Malloch's Genus *Incertus* 1 is probably the penultimate instar of this, or another species of the same genus.

The early stages of *Beris annulifera* and *morrisii*, and *Actina viridis* have not yet been described. The larva of the European *Beris val-lata* Foerst. has been described by de Meijere (1916) who found it among decaying leaves. The characteristic feature of this form is the arrangement of the minute setæ in small tufts upon the abdominal segments (fig. 28). *Actina viridis* is an anomalous form, the male having dichoptic eyes as in the genus *Actina*, but its wing venation is typically that of *Beris*. Handlirsch (1883) has described and

figured the puparium of *Chlorisops (Actina) tibialis* Meigen, an European species (fig. 17). The larvæ were found in the woods in leaf mold.

### Xylomyiinae.

*Xylomyia pallipes* is the only member of this subfamily of which I have seen larvæ. When placed in weak hydrochloric acid effervescence takes place as with the true Stratiomyiidae. My specimens were obtained from under loosened bark.

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#### EXPLANATION OF PLATES.

##### PLATE IX.

The figures are of the last instar larvæ unless otherwise stated.

FIG. 1. *Euparyphus greylockensis* John. Dorsum.

FIG. 2. *Euparyphus tetraspilus* Loew. Dorsum of seventh body segment.

FIG. 3. *Euparyphus tetraspilus* Loew. Venter of apical abdominal segments.

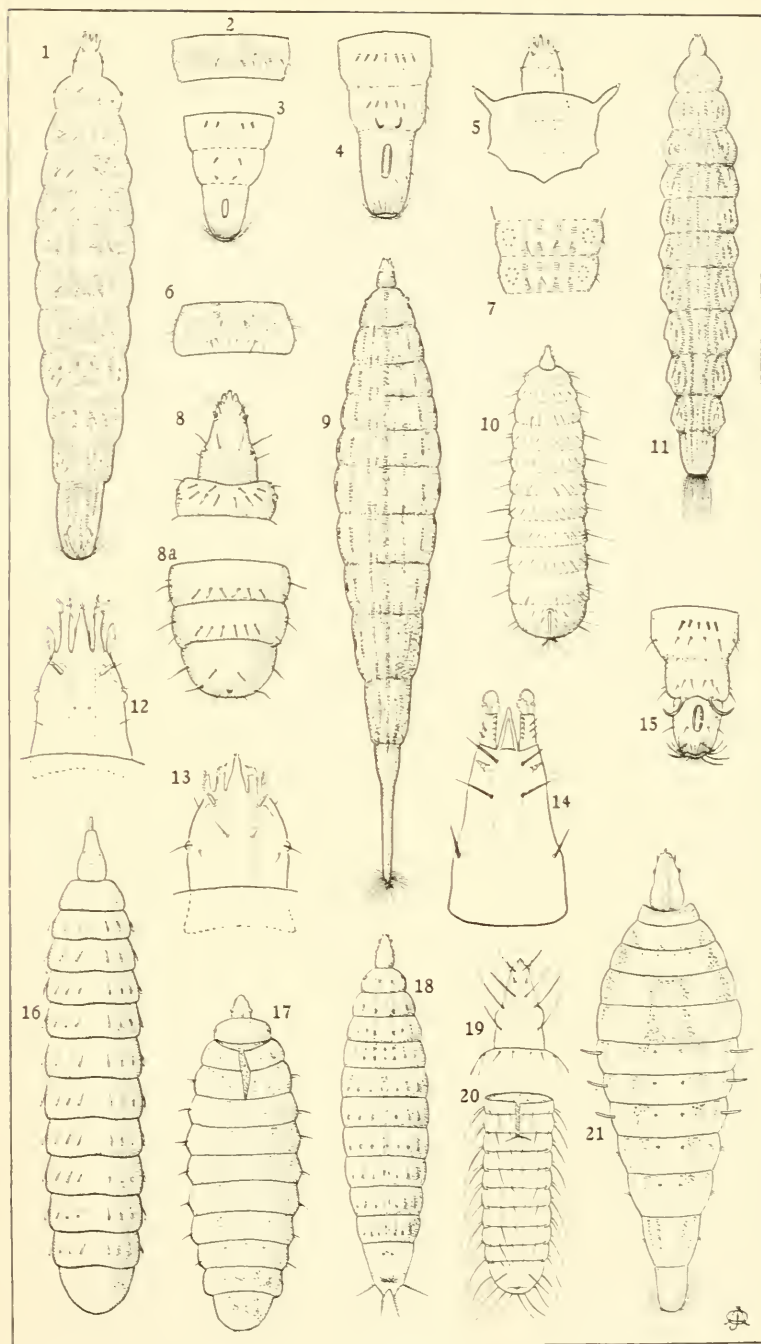
FIG. 4. *Euparyphus greylockensis* John. Venter of apical abdominal segments.

FIG. 5. *Euparyphus brevicornis* Loew. Dorsum of head and prothorax of puparium.

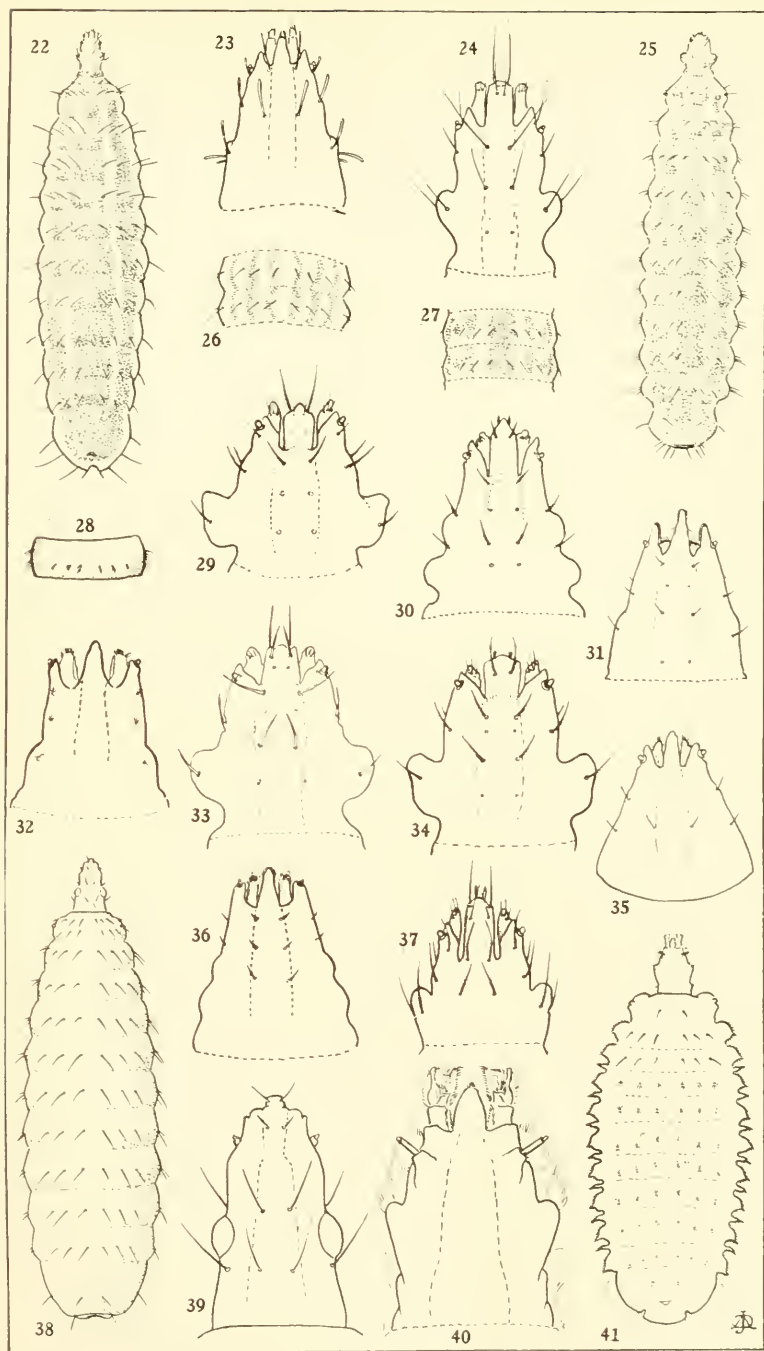
FIG. 6. *Euparyphus brevicornis* Loew. Dorsum of seventh body segment.

FIG. 7. *Euparyphus brevicornis* Loew. Dorsum of eighth and ninth body segments of penultimate instar.

FIGS. 8, 8a. *Neopachygaster maculicornis* Hine. Dorsum.











- FIG. 9. *Stratiomyia norma* Wied. Dorsum.  
 FIG. 10. *Zabrachia polita* Coq. Venter. After Johnson.  
 FIG. 11. *Odontomyia virgo* Wied. Dorsum.  
 FIG. 12. *Euparyphus greylockensis* John. Dorsum of head.  
 FIG. 13. *Euparyphus brevicornis* Loew. Dorsum of head.  
 FIG. 14. *Zabrachia minutissima* Zett. Dorsum of head. After de Meijere.  
 FIG. 15. *Euparyphus brevicornis* Loew. Venter of terminal segments.  
 FIG. 16. *Pachygaster ater* Panz. Dorsum. After Heeger.  
 FIG. 17. *Chlorisops tibialis* Meig. Dorsum of puparium. After Handlirsch.  
 FIG. 18. *Nemotelus pantherinus* Linn. Dorsum. After Lundbeck.  
 FIG. 19. *Eupachygaster henshawi* Malloch. Dorsum of head. After Malloch.  
 FIG. 20. *Eupachygaster henshawi* Malloch. Dorsum of puparium. After Malloch.  
 FIG. 21. *Oxycera trilineata* Linn. Dorsum. After Heeger.

## PLATE X.

- FIG. 22. *Microchrysa polita* Linn. Dorsum.  
 FIG. 23. *Microchrysa polita* Linn. Dorsum of head of penultimate instar.  
 FIG. 24. *Microchrysa polita* Linn. Dorsum of head.  
 FIG. 25. *Geosargus decorus* Say. Dorsum.  
 FIG. 26. *Geosargus viridis* Say. Dorsum of sixth and seventh body segments.  
 FIG. 27. *Macrosargus clavis* Will. Dorsum of sixth and seventh body segments.  
 FIG. 28. *Beris vallata* Foerst. Dorsum of sixth body segment. Adapted from de Meijere.  
 FIG. 29. *Geosargus cuprarius* Linn. Dorsum of head.  
 FIG. 30. *Macrosargus clavis* Will. Dorsum of head.  
 FIG. 31. *Macrosargus clavis* Will. Dorsum of head of penultimate instar.  
 FIG. 32. *Geosargus* Sp. A. Dorsum of head of penultimate instar.  
 FIG. 33. *Geosargus decorus* Say. Dorsum of head.  
 FIG. 34. *Geosargus viridis* Say. Dorsum of head.  
 FIG. 35. *Geosargus* Sp. B. Dorsum of head of penultimate instar.  
 FIG. 36. *Stratiomyid* II. Penultimate instar of *Hermetia illucens*? Dorsum of head.  
 FIG. 37. *Geosargus* Sp. A. Dorsum of head of last instar withdrawn from the head shown in fig. 32.  
 FIG. 38. *Hermetia illucens* Linn. Dorsum of puparium.  
 FIG. 39. *Hermetia illucens* Linn. Dorsum of head. After Malloch.  
 FIG. 40. *Allognosta fuscitarsis* Say. Dorsum of head.  
 FIG. 41. *Allognosta fuscitarsis* Say. Dorsum of puparium.

## NEW SPECIES OF SERICA (SCARABAEIDÆ). V.

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In order to somewhat facilitate the recognition of the new species here described it seems desirable to characterize and figure six of the closely allied, described species, *sericca*, *tristis*, *parallela*, *elongatula*, *mixta* and *curvata*.

**Serica sericea** Illiger.

*Melolontha sericea* Illiger, Olivier's Entomologie, ii, part 5, p. 75, footnote A (1802).

♂. Length, 9 mm.; width, 5.25 mm. Color deep chestnut, surface velvety and opaque but in shifting lights showing a very brilliant metallic sheen of rainbow colors.

The length may vary from 7.5-10.5 mm., the color from light chestnut to nearly black and the iridescence from a scarcely discernible amount to a sheen of much brilliance, the color and iridescence apparently depending upon the maturity and condition of the specimen.

Clypeus evenly but very feebly tumid, most evidently so just below the center; anterior reflexed margin clearly defined at the base by a transverse line, but feebly elevated, reaching only the height of the slight tumidity above it and forming an angle of about 120 degrees with its anterior face upon which are borne a few erect, brown setæ; viewed perpendicularly the anterior margin feebly, to moderately, curved at the center and very broadly and evenly rounded to the sides where it joins the lateral margins, viewed at an angle from above nearly straight, or but slightly more prominent at the center; lateral margins feebly elevated and almost continuous with the anterior margin, their union marked by a nearly obsolete angulation; upper half to two thirds of clypeus bare; punctures of only moderate size, rather evenly placed, and separated by scarcely half their own diameters; clypeal suture obtusely angled at the middle, fine, and not very distinct, but with a row of eight erect setæ, four on each side, immediately above it on the anterior margin of the front. Front with punctures separated by one to two diameters, and occipital area impunctate. Antennal club well developed, apparently exceeding the combined length of the preceding segments. Measurements of head: diameter of head through eyes, 23.5;<sup>1</sup> distance between inner eye margins, 15; length of head on median line, 17; extreme width of clypeus in front of incisure, 12; antennal club, 11.5; dorso-ventral diameter of eye, 8.

Pronotum only slightly convex, posterior angles distinct, nearly rectangular, sides only moderately curved, a little more arcuate and convergent

<sup>1</sup> Measurements in tenths of a millimeter.

in the anterior third, with a distinct margin and 8 or 9 erect, brown setæ; anterior margin of pronotum less distinct than the lateral margins and with smaller setæ which become obsolete toward the center; surface of pronotum finely and rather evenly punctured, the punctures shining and separated by one to three times their own diameters.

Measurements of pronotum: width through posterior angles, 40; width through anterior angles, 24; length on median line, 20.

Elytra with moderately impressed, usually line-like sulci, each with one to three confused rows of small shining punctures; interspaces of elytra evenly and moderately convex, sparsely and irregularly punctured, length 70, width 52.

Metasternum and posterior coxal plates nearly bare, with relatively fine punctures separated by about one to two diameters. Hind femora rather finely and sparsely punctured, but with two regular and nearly parallel rows of rather strong, setigerous punctures with about eight setæ to the row. Abdominal sternites finely and rather closely punctured and with well-developed rows of ambulatorial setæ. Pygidium similarly punctured, usually showing a slightly elevated, median, longitudinal line.

The genital armature of the male (Pl. XI) practically symmetrical; length 2.5 mm.

♀. Differs from the male in having the head, and pronotum rather more coarsely punctured, shining, not opaque and velvety, and usually without any iridescent luster. The antennal clubs are distinctly smaller than in the male, measuring 8 instead of 11.5.

The description and drawings are based upon a male and female labeled "Bergen county, N. J., May 19, 1918, Under leaves (E. D. Quirsfeld)."

On the assumption that Illiger's type (1802) is probably no longer in existence, these specimens are being labeled as neotypes.

Specimens examined: 175 ♂, 195 ♀.

Maine: Old Orchard, 1 ♀; Paris, 1 ♂.

New Hampshire: Hookset, 1 ♂; Manchester, 2 ♀.

Vermont: Bennington Co., 2 ♀.

Massachusetts: "Mass.," 2 ♂, 4 ♀; Cambridge, 1 ♂; Fall River, 1 ♂; Framingham, 5 ♂, 1 ♀; Ipswich, 1 ♀; Lowell, 3 ♂, 2 ♀; Natick, 1 ♀; Sherborn, 1 ♂, 2 ♀; Stoneham, 2 ♂; Swansea, 1 ♂; Tyngsboro, 5 ♂, 5 ♀.

Connecticut: Colebrook, 1 ♂; Cornwall, 1 ♂; New Haven, 1 ♂, 2 ♀; Stamford, 2 ♀.

New York: "New York," 2 ♂, 4 ♀; Buffalo, 1 ♀; Ithaca, 3 ♀; Nyack, 1 ♀; Wilmington, 1 ♂, 1 ♀.

Pennsylvania: "Pa.," 1 ♂; Allentown, 1 ♂; Brandtsville, 1 ♂; Enola, 2 ♂; Harrisburg, 1 ♀; Heckton Mills, 2 ♀; Linglestown, 1 ♂; Rockville, 4 ♂; S. College, 1 ♂; Wilmerding, 1 ♀.

New Jersey: Bergen Co., 3 ♂, 5 ♀; Jamesburg, 1 ♀; Riverton, 2 ♂, 1 ♀; South Orange, 1 ♀; Spotswood, 1 ♀.

Virginia: Charlottesville, 1 ♂, 1 ♀.

Ohio: Cincinnati, 1 ♂.

Michigan: "Mich.," 2 ♂, 5 ♀; Berrien Co., 1 ♂, 2 ♀; Douglas Lake, Cheboygan Co., 3 ♀; South Haven, 2 ♂, 2 ♀.

Wisconsin: "Wisconsin," 3 ♂, 3 ♀.

Illinois: "Ill.," 4 ♂, 2 ♀; "Northern Illinois," 3 ♂, 5 ♀; "Southern Illinois," 1 ♀; Aurora, 1 ♂, 2 ♀; Chicago, 5 ♂; De Kalb Co., 1 ♂; Havana, 1 ♂; Pekin, 1 ♀; Sterling, 2 ♂, 4 ♀; Topeka, 1 ♂.

Indiana: Clarke Junction, 1 ♀; Crawford Co., 2 ♀; Fountain Co., 1 ♀; Lake Co., 1 ♀; Millers, 10 ♂, 7 ♀; Pine, 1 ♂; Posey Co., 2 ♂; Putnam Co., 1 ♂; Starke Co., 1 ♀.

North Carolina: "N. C.," 3 ♀; Black Mountains, 2 ♂, 4 ♀; Highlands, 2 ♀.

Florida: "Fla.," 1 ♀; Lake City, 1 ♀.

Missouri: "Mo.," 1 ♂.

Iowa: De Witt, 1 ♂; Iowa City, 1 ♂, 1 ♀; Spirit Lake, 1 ♂; Waukon, 1 ♂, 1 ♀; West Lake Okoboji, Dickenson Co., 1 ♀.

South Dakota: Englewood, 1 ♀.

Nebraska: Ashland, 1 ♀; Halsey, 1 ♂; Hooper, 1 ♂, 2 ♀; Lincoln, 1 ♂, 1 ♀; Nebraska City, 7 ♂, 10 ♀; Omaha, 4 ♂, 1 ♀; Sarpy Co., 3 ♂, 3 ♀; South Bend, 2 ♀; Sioux Co., 3 ♂, 5 ♀; West Point, 1 ♂, 2 ♀.

Kansas: "Kansas," 1 ♂; Medora, 1 ♂, 1 ♀; Riley Co., 24 ♂, 19 ♀.

Utah: "Utah," 1 ♂.

Montana: Bridger Mountains, 1 ♂; Gallatin Co., 2 ♂; Middle Creek Canyon, 2 ♂.

Idaho: Kendrick, 1 ♂; Maiden, 1 ♂.

Washington: "Eastern Washington," 1 ♂; Spokane, 2 ♂, 7 ♀.

#### CANADA:

Ontario: "Eastern Ontario," 1 ♀; "Western Ontario," 1 ♀; Hastings Co., 1 ♂; Ottawa, 5 ♂, 2 ♀; Point Pelee, 1 ♀; Toronto, 2 ♂, 2 ♀; Trenton, 3 ♂.

Quebec: Ft. Coulonge, 1 ♀; Lanoraie, 3 ♂, 1 ♀; Montreal, 2 ♀; Three Rivers, 2 ♂, 1 ♀.

Manitoba: Aweme, 1 ♂, 2 ♀; Onah, 2 ♂, 11 ♀; Thornhill, 1 ♀; Winnipeg, 4 ♂, 2 ♀.

British Columbia: "British Columbia," 1 ♂, 1 ♀; Cawston, 1 ♀; Vernon, 2 ♀.

North West Territory: "North West Territory," 1 ♀.

#### *Serica tristis* Le Conte.

*Serica tristis* Le Conte, Agassiz Lake Superior, Boston, iv, p. 226 (1850).

*Serica tristis* Le Conte, Journ. Acad. Nat. Sci. Phila., Ser. 2, iii, p. 275 (1856).

*Serica tristis* Blatchley, Coleoptera of Indiana, pp. 956, 958 (1910).

♂. Length, 7-8.5 mm.; width, 4.5-5 mm. Color varying from chestnut to nearly black, depending largely upon the degree of maturity and condition of the specimen, surface moderately shining, distinctly less velvety than in *sericea*, but with a similar though less intense, metallic, iridescent sheen.

Clypeus resembling that of *sericea*, but differing in having the anterior margin evidently less strongly reflexed, not more elevated than the lateral margins; anterior margin viewed at an angle from above, broadly curved at the center and with the corners distinctly more prominent and less rounding than in *sericea*; clypeus nearly devoid of erect hairs and with the puncturation averaging stronger than in *sericea*, the clypeal suture a little less distinct and with only two indistinct setigerous punctures at the sides. Measurements of head: diameter of head through eyes, 22; distance between inner eye margins, 15; length of head on median line, 18; extreme width of clypeus in front of incisure, 12; antennal club, 9; dorso-ventral diameter of eye, 7.

Pronotum closely resembling that of *sericea*, but a little more strongly punctured, and with the marginal setæ less well developed. Measurements of pronotum: width through posterior angles, 36; width through anterior angles, 24; length on median line, 20.

Elytra with stronger and wider sulci than in *sericea*, and with two to three much confused rows of densely placed, moderately strong punctures; interspaces relatively narrower and each with an irregular row of strong punctures; length, 57; width, 45.

Metasternum and posterior coxal plates a little more strongly punctured than in *sericea*; hind femora also more coarsely punctured, but with the two rows of setæ less evident and well developed; abdominal sternites with fine, shallow punctures, and only moderately well-developed rows of ambulatorial setæ; pygidium with stronger punctures than the sternites, and showing traces, at least in the apical half, of an elevated, median, longitudinal line.

The genital armature of the male is a counterpart of that of *sericea* and therefore does not require a separate figure.

♀. Differs from the male in having a slightly more shining and less iridescent pronotum, but the difference is not conspicuous in *sericea*, and in having much shorter antennal clubs, 4.7 instead of 9 as in the male.

Specimens examined: 102 ♂, 78 ♀.

Maine: Biddeford, 1 ♂; Machias, 1 ♀; Monmouth, 6 ♂, 5 ♀; Paris, 11 ♂, 15 ♀; Portland, 3 ♂; Wales, 10 ♂, 13 ♀.

New Hampshire: "N. H.," 1 ♂, 1 ♀; Bretton Woods, 2 ♂, 3 ♀; Hanover, 1 ♂; Hookset, 1 ♀; Intervale, 1 ♀; Mt. Moosilauke, 1 ♂, 2 ♀; Mt. Washington, 4 ♂, 1 ♀; N. Conway, 4 ♂, 2 ♀; Three Mile Island, 9 ♂, 4 ♀.

Massachusetts: "Mass.," 3 ♂; Edgartown, 1 ♂, 1 ♀; Framingham, 3 ♀;

Tyngsboro, 1 ♂; Wellesley, 4 ♂, 1 ♀.

New York: Ithaca, 1 ♂; Peru, 4 ♂, 1 ♀.

Wisconsin: Bayfield, 1 ♀.

Illinois: Chicago, 1 ♂.

Minnesota: Duluth, 1 ♀.

## CANADA:

Ontario: "E. Ontario," 1 ♂; Hymers, 1 ♂; "Hudson Bay," 1 ♂; Nepigon, 3 ♂, 1 ♀; Ottawa, 1 ♂, 1 ♀.

New Brunswick: Chaleur Bay, 1 ♂; St. Andrews, 1 ♀; St. Stephens, 1 ♂. Quebec: Charlevoix Co., 1 ♀; Fort Coulonge, 3 ♂, 2 ♀; Three Rivers, 4 ♂, 2 ♀.

Nova Scotia: Aylesford, 1 ♀; Kentville, 2 ♂, 2 ♀; Middleton, 1 ♀; Round Hill, 2 ♂; Truro, 9 ♂, 7 ♀.

Manitoba: Aweme, 1 ♂; Onah, 1 ♀; Stonewall, 1 ♂; Winnipeg, 1 ♂, 1 ♀.

Magdalen Islands: 1 ♂.

The absence of any differential characters in the genital armatures of *tristis* and *sericea* might lead one at first to suppose that they were not specifically distinct. However, the two forms do not intergrade, though occupying overlapping, but not coextensive, ranges. We should therefore regard them as quite distinct species.

**Serica apatela** new species.

♂. Length, 8 mm.; width, 5 mm. Color brown (dark bay), surface less strongly opaque and velvety than in *sericea*, but with a well-developed and brilliant sheen of colors. In other characters greatly resembling *sericea*, but differing from that species in having relatively shorter and less parallel-sided elytra, and in having the sparse, erect clypeal hairs well distributed instead of confined to the anterior portion of the clypeus as in *sericea*.

The genital armature resembles the type seen in *sericea* and *tristis*, but is quite distinct in the possession of the thorn-like tooth on the somewhat modified claspers (Pl. XII).

♀. Differs from the ♂ in having the head and pronotum polished and shining, without any iridescent luster, and in having a small antennal club (6.5 instead of 12), thus showing a greater difference in the size of the antennal clubs than was the case in *sericea*.

Type: ♂. Tumblin Gap, Alabama, June 3 to 8, 1911 (H. P. Loding).

Allotype: ♀. Same data.

Paratype: 1 ♀. Monte Sano, Madison Co., Alabama, June 9 to 11, 1911 (H. P. Loding).

**Serica parallela** Casey.

*Serica parallela* Casey, Contributions to Coleopterology of N. A., ii, p. 176 (1884).

*Serica parallela* Brenske, Berl. Ent. Zeitschr., xlvii, p. 36 (1902).

♂. Length, 7.5–8.5 mm.; width, 4.2–4.8 mm. Color varying through the shades mahogany red, bay and chestnut, surface velvety and opaque, with only a slight iridescence observable when viewed at an oblique angle in good light.

Clypeus plane, or feebly tumid at the middle of its apical third; ante-



rior margin abruptly but narrowly reflexed, continuous with the lateral margins which are as strongly, but less suddenly elevated; lateral incisures obsolete but the point of union between the apical and lateral reflexed margins slightly marked by the depressed line defining the base of the apical margin; apical margin viewed perpendicularly very feebly curved, viewed at an angle from above practically straight; surface of clypeus rather closely punctate, sometimes with a mixture of coarse and fine punctures, the rather numerous coarse punctures bearing erect, yellow hairs. Front sparsely covered with small, feeble, shining punctures, and with a row of small setigerous punctures following the inner eye margins and the nearly obsolete clypeal suture. Measurements of head: diameter of head through eyes, 23; distance between inner eye margins, 13; length of head on median line, 17; extreme width of anterior reflexed margin, 10.5; antennal club, 10; dorso-ventral diameter of eye, 9.

Pronotum rather evenly covered with small, shallow, shining punctures, separated by one to three times their own diameter; mid-lateral piceous spot distinct. Measurements of pronotum: width through posterior angles, 34; width through anterior angles, 22; length on median line, 20.

Elytra sculptured much as in *sericea*, but usually with somewhat less sharply lined sulci, and finer punctures arranged in two to three much confused rows: length, 55; width, 44.

Metasternum, posterior coxal plates and abdominal sternites closely resembling those of *sericea*.

The genital armature of the male (Pl. XIII) differs decidedly from that of *sericea* and *tristis*; length, 2.2 mm.

♀. Differs from the male in its much shorter antennal club (6.5 instead of 10) more convex under line of abdomen, and larger and less emarginate last ventral segment.

Specimens examined:

Massachusetts: Fall River, 2 ♂, 2 ♀; Framingham, 14 ♂, 13 ♀; Ipswich, 1 ♀; Lynn, 1 ♂; Martha's Vineyard, 1 ♂; Natick, 1 ♂; Sherborn, 1 ♀; Springfield, 1 ♂; Wareham, 1 ♂; Tyngsboro, 7 ♂, 6 ♀.

New York: Bronx Park, 3 ♀; Long Island, 1 ♂; Staten Island, 1 ♂.

Pennsylvania: "Pa." 1 ♀; Pittsburgh, 1 ♀; Rockville, 1 ♂.

New Jersey: Bergen Co., 1 ♂, 2 ♀; Fort Lee District, 1 ♂; Jamesburg, 1 ♂, 1 ♀; Lahaway, Ocean Co., 1 ♂; Riverton, 3 ♂, 4 ♀.

Virginia: "Virginia," 1 ♂; Charlottesville, 2 ♀.

Michigan: Douglas Lake, Cheboygan Co., 2 ♀; Harris Co., 1 ♀.

Wisconsin: "Wisc.," 1 ♂.

Illinois: "Ill.," 1 ♂; "Northern Illinois," 4 ♂; Chicago, 1 ♂.

Indiana: Millers, 1 ♂, 2 ♀.

North Carolina: "N. C.," 1 ♂; Raleigh, 3 ♂.

Georgia: Clayton, 1 ♂.

## CANADA:

Ontario: Jubilee Point, 1 ♂.

Quebec: Three Rivers, 1 ♂.

*Parallela* is easily separable from *sericea* and *tristis* by its lighter, more rufous color; greatly reduced iridescence; greater extent and prominence of erect clypeal hairs; relatively longer and narrower pronotum, showing the mid-lateral piceous spot and the same type of dull, velvety surface in both sexes.

***Serica mystaca* new species.**

This species so closely resembles *parallela* Casey that it can be separated from it only with difficulty, if at all, except by the examination of the male genital armature. When compared in series with *parallela* the following average differences seem to obtain: *mystaca* is very slightly larger and more robust in form, darker in color, often more distinctly iridescent (sometimes even approaching *sericea* in this character), and has somewhat coarser, longer and more closely placed clypeal hairs, the clypeus is slightly wider anteriorly, with the corners more broadly rounded and the anterior reflexed margin more distinctly curved medially when viewed perpendicularly.

The genital armature of the male shows rather more than the usual amount of variation. In fact no two of the twelve armatures examined are exactly alike. Sometimes the serrated angulation of the claspers is more strongly developed (New York and Pennsylvania) than in the type as here illustrated (Pl. XIV). From this condition the angulation decreases in degree until it is nearly or quite obsolete (North Carolina and Nebraska). When viewed from the end the median arcuation of the claspers varies considerably, and when viewed from the side the ventral prominence of the stalk just below the claspers also varies somewhat in position and strength, but is always rather well developed. The tips of the claspers are always strongly flexed outwardly. Length of armature, 2.5 mm.

♀. Differs from the male by its distinctly smaller antennal club, 7.7 instead of 12, and somewhat smaller eyes, 8.2 instead of 9.

Type: ♂. New Haven, Connecticut, April 20, 1911 (Champlain).

Allotype: ♀. New Haven, Conn., Apr. 21, 1911 (Champlain).

Paratypes: 16 ♂, 8 ♀.

Massachusetts: Cohasset, 1 ♂.

Rhode Island: "R. I.," 1 ♂.

Connecticut: "Conn.," 1 ♀.

New York: Bronx, 1 ♂; Hudson, 1 ♂.

Pennsylvania: Harrisburg, 1 ♂; Jeannette, 1 ♂.

New Jersey: Snake Hill, 1 ♀.

Illinois: "Ill.," 1 ♀; "N. Ill.," 1 ♂; Carbondale, 1 ♂; Ozark, 1 ♂.

Indiana: Posey Co., 1 ♂.

North Carolina: "N. C.," 1 ♂.

South Carolina: "S. C.," 1 ♀.  
Alabama: Mobile, 1 ♀.  
Louisiana: Vowell's Mill, 2 ♀.  
Iowa: Decorah, 1 ♂, 1 ♀; Iowa City, 1 ♂; Unionville, 1 ♂.  
Nebraska: Nebraska City, 1 ♂.  
Arizona: "Ariz.," 1 ♂.

**Serica aspera** new species.

Like the preceding species *aspera* bears a remarkable resemblance to *parallela*. It averages slightly smaller, and the antennal clubs are distinctly longer, measuring 12 instead of 10 as in *parallela*. By the characters shown in the male genital armature (Pl. XV) the species can be readily separated from *mystaca* and *parallela*, but without the aid of these characters its certain identification must be considered open to question.

Type: ♂. Southern Pines, North Carolina, April 28, 1914 (A. H. Manee).

Allotype: ♀. Southern Pines, North Carolina (A. H. Manee).

Paratypes: 5 ♂ and 5 ♀.

North Carolina: Southern Pines, 2 ♂, 3 ♀.

South Carolina: "S. C.," 1 ♀; Camden, 1 ♂.

Georgia: "Georgia," 1 ♂.

Florida: Marion Co., 1 ♂.

Alabama: Mobile, 1 ♀.

**Serica delicata** new species.

♂. Length, 7.5 mm.; width, 4 mm. Color amber brown, surface opaque and only slightly iridescent.

Clypeus broadly and very feebly convex in the apical two thirds, apical and lateral margins suddenly, moderately elevated, clypeal notch obsolete, but its position indicated by a slight angulation of the elevated rim at the point of juncture of its apical and lateral parts, apical margin viewed perpendicularly, evenly and moderately curved or bent, viewed at an angle from above, feebly arcuate; surface of clypeus evenly and closely covered with small punctures, separated by a little less than their own diameters. Front a little less closely punctured. Eyes and antennal clubs relatively large. Measurements of head: diameter through eyes, 22; distance between inner eye margins, 11; length of head on median line, 15; extreme width of anterior reflexed margin, 9; antennal club, 12; dorso-ventral diameter of eye, 9.

Pronotum only feebly convex, sides nearly straight and but slightly convergent anteriorly, and showing, as is usual with the pallid species, a small, mid-lateral, piceous spot; punctures small, evenly and closely placed, separated on the average by about their own diameters. Measurements of pronotum: width through posterior angles, 32; width through anterior angles, 23; length on median line, 19.

Elytra with distinct line-like striae, each stria with a regular row of small

punctures separated by about twice their own diameters, but the distinctness of the rows of stria punctures somewhat obscured by irregularly spaced, adjacent punctures; length, 5.5; width, 40.

Beneath opaque, practically bare, metasternum and posterior coxal plates with moderately strong punctures, separated by about their own diameters or slightly more; abdominal sternites, except the last, with much finer punctures, but with the single rows of ambulatorial setae fairly well developed.

Genital armature of male (Pl. XVI) symmetrical and somewhat resembling that of *sericea*; length, 2.7 mm.

♀. Differs from the male by its much smaller antennal clubs, 6.5 instead of 12, and smaller eyes, 7.7 instead of 9.

Type: ♂. Florida.

Allotype: ♀. Florida (Horn Collection).

Paratypes: 4 ♂, 2 ♀.

Florida: "Fla.," 4 ♂; Green Cove Spring, 1 ♀; New River, 1 ♀.

### ***Serica tantula* new species.**

This species bears a remarkable resemblance to *delicata* in size, color, luster and structure. Although only a single specimen is at hand the writer would judge the following slight differences to be specific: eyes smaller, 7.6 instead of 9; antennal club slightly shorter, 10.6 instead of 12; elytral striae less sharply defined or line-like and with their punctures irregularly arranged.

Genital armature of the male (Pl. XVII) with the claspers radically different in size and shape from those in the apparently related species, *delicata* and *pusilla*.

Type: ♂. Lake Worth Florida (L. B. Parker), 1889.

### ***Serica pusilla* new species.**

Probably recognizable with certainty from the two preceding species only by the form of the male genital armature (Pl. XVIII). The eyes and antennal clubs are smaller as in *tantula* and the elytral striae line-like and more regularly punctured as in *delicata*. The elytra seem, however, to show a stronger iridescent sheen than in either *delicata* or *pusilla*.

Type: ♂. Florida.

Allotype: ♀. Florida, Marion Co. (Collection of H. C. Fall).

Paratypes: 1 ♂, 1 ♀.

Florida: "Fla.," 1 ♂; Gulfport, 1 ♀.

### ***Serica sculptilis* new species.**

♂. Length, 6.5-7 mm.; width, 3.75-4 mm. Color bay to dark chestnut, surface bare and shining, entirely without bloom or iridescence and nearly devoid of pubescence except for some erect, golden brown hairs on the submentum, anterior coxae and femora, last sternite, pygidium and margins of pronotum and elytra.

Clypeus very broadly and feebly tumid just beyond the middle; appear-

ing distinctly though not strongly depressed just below the clypeal suture and before the anterior reflexed margin, and less so toward the sides; anterior and lateral margins less strongly and suddenly elevated than usual in the genus, and clypeal incisure poorly developed to obsolete; viewed perpendicularly the anterior elevated margin broadly and evenly curved at the middle, viewed at an angle from above straight; puncturation relatively coarse and much crowded, the punctures separated by about one third of their own diameter. Front with the punctures slightly coarser and less closely crowded; occipital region impunctate. Measurements of head: diameter of head through eyes, 16.5; distance between inner eye margins, 11; length of head on median line, 15; extreme width of anterior reflexed margin, 9; antennal club, 6; dorso-ventral diameter of eye, 5.3.

Pronotum but slightly convex, sides distinctly margined, only moderately arcuate and convergent from base to apex; surface rather strongly, closely and evenly punctured, the punctures a little more crowded toward the sides, but separated on the average by about their own diameters. Measurements of pronotum: width through posterior angles, 28.5; width through anterior angles, 17.6; length on median line, 16.

Elytra with the striæ shallow but distinctly lined, and each with three irregular rows of coarse punctures, confluent to separated by their own diameters, and encroaching upon the interspaces to their crests. Length of elytra, 5 mm.; greatest width, 3.75 mm.

Posterior coxal plates and sides of metasternum with moderately strong punctures, separated on the average by about their own diameters. Abdominal sternites, except the last, with fine, sparsely and irregularly placed punctures, and with the rows of ambulatorial setæ poorly developed; last sternite closely punctured.

The genital armature of the male (Pl. XIX) measures 1.7 mm. and is strongly characterized by its relatively thick, inflated basal portion and long, attenuated claspers.

♀. Differs from the male only by the usual secondary sexual characters, none of which are strongly marked.

Type: ♂. Camp Baldy, San Bernardino Co., California, June 14, 1917 (L. L. Muchmore).

Allotype: ♀. Mt. Wilson, California, June 18, 1903.

Paratypes: 7 ♂, 7 ♀.

California: "Cal.," Horn Collection, 1 ♂; Claremont, 2 ♂, 4 ♀; Ojai Valley, 2 ♂, 2 ♀; Mt. Wilson, 2 ♂, 1 ♀.

### *Serica solita* new species.

♂. Length, 8.2 mm.; width, 4.2 mm. Color dark auburn, subopaque, with traces of a metallic iridescence when viewed under a lens in shifting lights, but the iridescence and surface luster somewhat obscured by short, erect, ochraceous hairs.

Clypeus bare, plane or broadly and very feebly tumid at the middle of its apical third; anterior and lateral margins strongly, though not abruptly, elevated; position of lateral incisure very faintly or not at all indicated; elevated margin viewed perpendicularly, moderately arcuate at the middle and very broadly and evenly rounded at the corners, viewed at an angle from above with both the middle and corners slightly more prominent, making the anterior margin appear slightly bisinuate; surface of clypeus with rather small, deep punctures, separated by about half their own diameters. Front with the punctures separated by one to two times their own diameters, and with a row of about 18 coarse, setigerous punctures following the nearly obsolete clypeal suture and inner eye margins. Eyes and antennal clubs rather small. Measurements of head: diameter of head through eyes, 20.3; distance between inner eye margins, 14; length of head on median line, 15; extreme width of anterior reflexed margin, 11; antennal club, 7.6; dorso-ventral diameter of eye, 6.5.

Pronotum distinctly convex, with sides strongly and almost evenly arcuate from base to apex, posterior angles very obtusely rounded; puncturation a little less strong and dense than on the head, the average distance between the punctures being from one to two times their own diameters; apical and lateral margins of pronotum with a row of erect setæ. Measurements of pronotum: greatest width, 35.3; width through anterior angles, 21.7; length on median line, 21.5.

Elytra with the striæ narrow and shallow, each with a somewhat confused double row of punctures; interspaces broadly and feebly convex, the second, fourth and sixth a little wider and more numerous punctate than the others; both the striæ and the wider interspaces bearing irregular rows of erect, ochraceous hairs. Length of elytra, 62, greatest width, 42.

Metasternum and posterior coxal plates moderately punctured, the punctures separated by about their own diameters. Abdominal sternites less strongly and closely punctured, the ambulatorial setæ poorly developed, scarcely distinguishable from the fine semi-recumbent sternal hairs. Thoracic sternum, basal portion of middle and front legs, and submentum fairly well clothed with rather long erect, ochraceous hairs.

Genital armature of male (Pl. XX) 2.5 mm. in length and considerably resembling that of *elongatula* Horn.

♀. Differs from the male in having slightly smaller eyes (6 instead of 6.5) and smaller antennal clubs (6 instead of 7.6). The under line of the abdomen more convex than in the male and the erect, ochraceous hairs slightly longer, more numerous and shaggy in appearance.

Type: ♂. Carmel, Monterey Co., California, June 18, 1918.

Allotype: ♀. Carmel, Monterey Co., California, June 16, 1918.

Paratypes: 99 ♂, 16 ♀.

California: "Calif.," 3 ♂; Carmel, 88 ♂, 9 ♀; Alameda Co., 6 ♂, 7 ♀; Monterey, 1 ♂; San Francisco, 1 ♂.

All specimens from Carmel collected by L. S. Slevin.



***Serica elongatula* Horn.**

*Serica elongatula* Horn, Trans. Amer. Ent. Soc., iii, p. 77, 1870.

♂. Length, 6.5 mm.; width, 3.3 mm. Color bay to chestnut, subopaque and faintly sericeous.

Clypeus not at all depressed, the anterior, reflexed margin distinctly but not suddenly elevated, the angle of elevation from the plane of the clypeus being about 45 degrees; anterior margin viewed perpendicularly only feebly arcuate medially, viewed at an angle from above slightly more prominent at the middle and sloping to the sides; angles broadly rounded, and lateral margins less strongly elevated than the anterior; clypeal incisure distinct but very shallow and obtuse; clypeal puncturation moderately strong, the punctures separated by about their own diameters. Front less densely and regularly punctate than the clypeus, occipital area often impunctate. Antennal club large, slightly exceeding the total length of the antenna. Eyes comparatively small. Measurements of head: diameter of head through eyes, 18; distance between the inner eye margins, 12.3; length of head on median line, 13; extreme width of clypeus in front of incisure, 10.3; antennal club, 9.4; dorso-ventral diameter of eye, 6.

Pronotum nearly twice as wide as long, very convex, slightly wider at the middle than at the base, with the margins strongly and nearly evenly arcuate when viewed from the side; posterior angles strongly rounded and anterior angles rectangular; surface with small, evenly distributed punctures, separated on the average by about twice their own diameters. Measurements of pronotum: width through posterior angles, 28; width through middle, 30; width through the anterior angles, 19; length on median line, 16. Scutellum subopaque, finely and quite evenly punctate, except for the shining and impunctate apex; length, 6.5; width, 7.

Elytral striæ distinct and line-like, each with a row of rather small, closely and irregularly placed punctures; interspaces sparsely punctate, nearly flat, the second, fourth and sixth slightly wider than the others. Length of elytra, 46; greatest width, 33.

Metasternum and posterior coxal plates, especially the latter, closely and rather coarsely punctate, abdomen finely and sparsely punctate. Under surface very sparsely clothed with rather long, fine, ochraceous-buff hairs, which become coarser, denser and much more conspicuous on the coxæ and femora of the front and middle legs.

The genital armature of the male (Pl. XXI) measures 1.8 mm.

Specimens examined: 6 ♂, California.

The drawings and above description are from a specimen labeled "Cal." "Horn Coll. H. 5683." The Horn collection contains four additional male specimens also labeled "Cal." There is, however, in the Le Conte collection a single male bearing the label "Owen's Valley, California. *Serica elongatula* Horn." Since the labels are

presumably in Dr. Horn's handwriting, and since this seems to be the only one of the original series of specimens bearing the exact data given in the original description, possibly it might with propriety be regarded as the holotype of the species in place of the one now so designated in the Horn collection. Through the courtesy of Dr. Banks the writer was permitted to mount the genital armature of this specimen and found it exactly like the armature here figured. Thanks are due to Dr. Skinner for the privilege of examining the specimens in the Horn collection.

*Elongatula* is not common in collections, in fact the only specimens known to the writer are those above mentioned. With several thousand specimens of *Serica* at hand, representing many species, it becomes evident that Dr. Horn's statement concerning *elongatula*: "Differs from all our species by its more elongate form, parallel sides, more transversely convex thorax and elytra," has no descriptive value, but to the contrary, may be responsible for many misdeterminations.

***Serica mixta* Le Conte.**

*Serica mixta* Le Conte, Journ. Acad. Nat. Sci., Phila., Ser. 2, vol. iii, p. 276, 1856.

♂. Length, 7.5 mm.; width, 4.25 mm. Color brownish testaceous (argus brown), surface somewhat opaque, dulled by a sericeous bloom, probably quite distinct in fresh material.

Clypeus level with the front, and unmodified, the anterior margin rather strongly elevated, the lateral margins scarcely less so, and not separated from the apical margin by an incisure, there being a scarcely discernible waver in the rim at the juncture of its apical and lateral parts; viewed perpendicularly the anterior, elevated margin only very slightly arcuate at the middle, with the corners very broadly rounded, viewed at an angle from above almost level; surface of clypeus shining, covered with distinct, moderate-sized punctures, separated by scarcely their own diameters. Clypeal suture obtusely angled, or nearly arcuate, at the middle, fine and not very conspicuous. Front opaque, a little less strongly, closely and evenly punctured than the clypeus. Antennal club of usual size, about as long as the combined length of the preceding antennal joints. Measurements of head: diameter of head through eyes, 21; distance between inner eye margins, 13; length of head on median line, 15; antennal club, 9; dorso-ventral diameter of eye, 7.

Pronotum not very convex, the punctures only moderately fine, rather evenly placed and separated by about their own diameters; posterior angles obtuse but fairly distinct, lateral margins moderately arcuate; near the

lateral margins and about three fifths of the way from the base, a small, slightly impressed area with a pigmented spot on its posterior side. Measurements of pronotum: width through posterior angles, 31; width through anterior angles, 22; length on median line, 17.6. Scutellum finely punctured, more closely so toward the sides; length, 7.6; width, 7.6.

Elytra with rather feebly impressed, line-like striæ, each stria with a single slightly irregular row of rather small, but deep, setigerous punctures, separated by one and one half to two times their own diameters; the hairs pallid, inconspicuous, and probably semi-recumbent; the intervals feebly convex, with the second, fourth, and sixth slightly wider than those between, sparsely and very irregularly punctured, the punctures slightly finer than the stria punctures, and often close to them. Length of elytra, 55; width, 42.5.

Metasternum and posterior coxal plates, especially the latter, shining, and rather strongly punctured, the punctures separated by one to two times their own diameters. Abdominal sternites opaque, finely and indistinctly punctured, and with the usual, single, transverse rows of coarse, setigerous punctures. Under surface thinly clothed with semi-erect yellow hairs; the pubescence longer and denser on the anterior and middle legs and mesosternum.

Length of genital armature of male, 2.6 mm. (Pl. XXII). The membrane below the base of the claspers extends half way down the ventral surface of the stalk of the armature and is broadly divided by a median, tapering, chitinous process extending upward to nearly, or quite, even with the apex of the stalk. This important feature is indicated, though perhaps not very clearly, in the accompanying plate.

♀. Unknown.

Types: three males in the Le Conte collection, from San Diego, California, labeled "*mixta* 1," "*mixta* 2" and "*mixta* 3."

All three specimens were dissected, and type number two was used for the drawings and description here given. For the privilege of dissecting and studying these types the writer is greatly indebted to Dr. Banks.

*Mixta* is known to the writer only by the Le Conte types, although many specimens of California *Serica*s have been examined. Perhaps it is not a common species as has been supposed.

#### ***Serica curvata* Le Conte.**

*Serica curvata* Le Conte, Journ. Acad. Nat. Sci., Phila., Ser. 2, iii, p. 276. 1856.

♂. Length, 7-10 mm.; width, 3.75-5.5 mm. Color varying from amber brown to a very dark auburn, surface somewhat shining, but not polished, and in the darker specimens showing distinct traces of a sericeous, metallic luster.

Clypeus with discal area nearly or quite level with the front, but slightly,

or sometimes not at all, tumid just below the middle. Margins of clypeus rather strongly but not abruptly elevated, the lateral margins nearly as prominent as the anterior, and separated from it by a poorly defined or obsolete notch; anterior portion of clypeus wider than usual, with prominent but strongly rounded corners, the reflexed margin viewed perpendicularly broadly and moderately arcuate at the middle, viewed at an angle from above nearly straight; puncturation of clypeus moderately strong and dense, the punctures separated by their own diameters or less. Front a little less regularly and closely punctured, and occipital area impunctate. Antennæ and eyes of average size. Measurements of head: diameter of head through eyes, 19; distance between inner eye margins, 11.5; length of head on median line, 13; extreme width of clypeus at the point of the nearly obsolete incisure, 6.5; antennal club, 7; dorso-ventral diameter of eye, 6.

Pronotum, transversely, more convex than usual, the sides evenly and rather strongly rounded from base to apex. Surface evenly covered with moderate-sized punctures, separated by one to two times their own diameters. A small piceous spot just above the side margins of the pronotum, distinct on pallid specimens, but discernible even on the darkest ones. Measurements of pronotum: greatest width just in front of the rounded posterior angles, 31; width through the obtuse anterior angles, 19; length on median line, 19. Scutellum punctured like the pronotum; length, 8; greatest width, 8.

Elytra with moderately impressed, line-like striæ, each stria having a single row of rather small punctures, separated by about their own diameters. Puncturation of the intervals rather fine, sparse, and irregular, the punctures often more closely placed adjoining the lines of stria punctures. The intervals but slightly convex, sometimes nearly flat, the second, fourth and sixth a little wider than the others. Length of elytra, 54; greatest width, 37.

Metasternum, posterior coxal plates and hind femora with the usual moderately strong, closely placed punctures. Abdominal sternites very finely, sparsely punctured, and devoid of hair except for the rather conspicuous single rows of erect setæ.

Genital armature of male (Pl. XXIII) 2-3 mm. in length.

♀. Differs from the male in having slightly smaller antennæ, and the usual more robust form of the abdomen.

Specimens examined: 67 ♂, 20 ♀.

North Dakota: Morton Co., 1 ♂.

Nebraska: Monroe Canyon, Sioux Co., 11 ♂; Pine Ridge, Dawes Co., 2 ♂; "Valley of the Platte" (Nebraska?), 2 ♂, Le Conte's types.

Colorado: Durango, 1 ♂; Pagosa Springs, 1 ♂.

California: Mill Valley, Marin Co., 1 ♂.

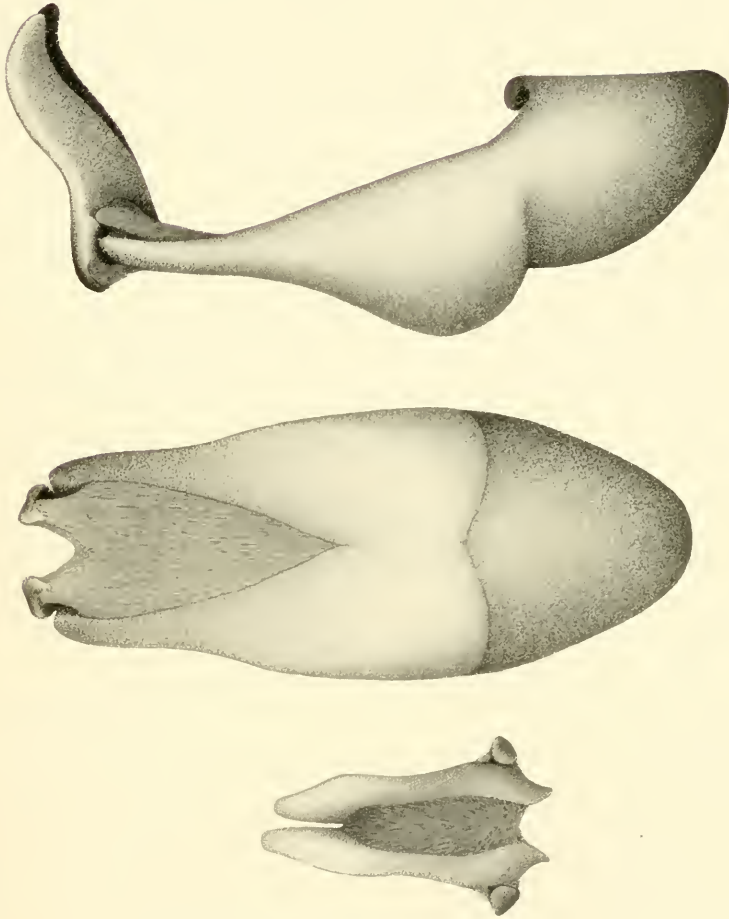
Nevada: 5 ♂.

Utah: Eureka, 3 ♂, 7 ♀.

Montana: Havre, 5 ♂; Missoula, 1 ♂.

Idaho: 1 ♂; Coer d'Alene, 1 ♀.

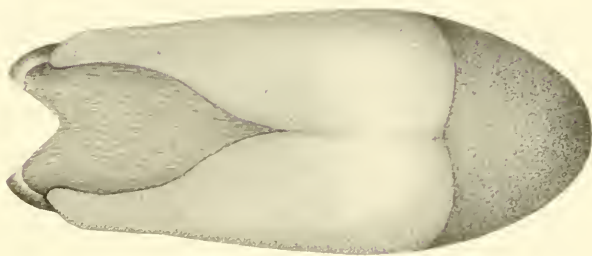
Oregon: Hood River, 2 ♂.



SERICA SERICEA ILLIGER.







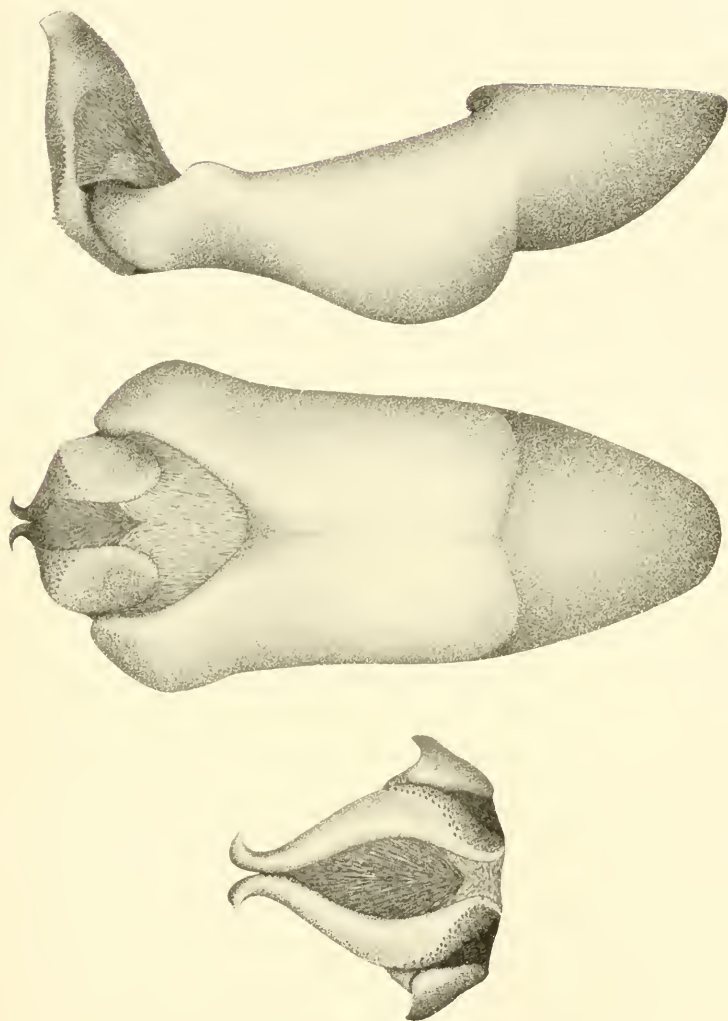
SERICA APATELA, DAWSON.





SERICA PARALLELA, CASEY.

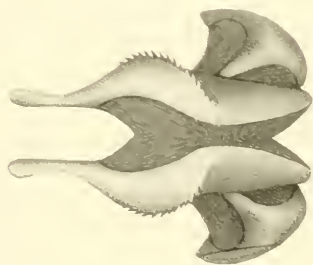
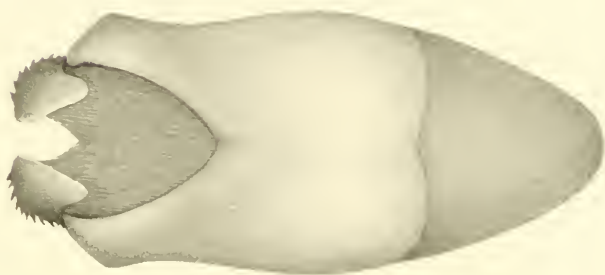




SERICA MYSTACA, DAWSON.

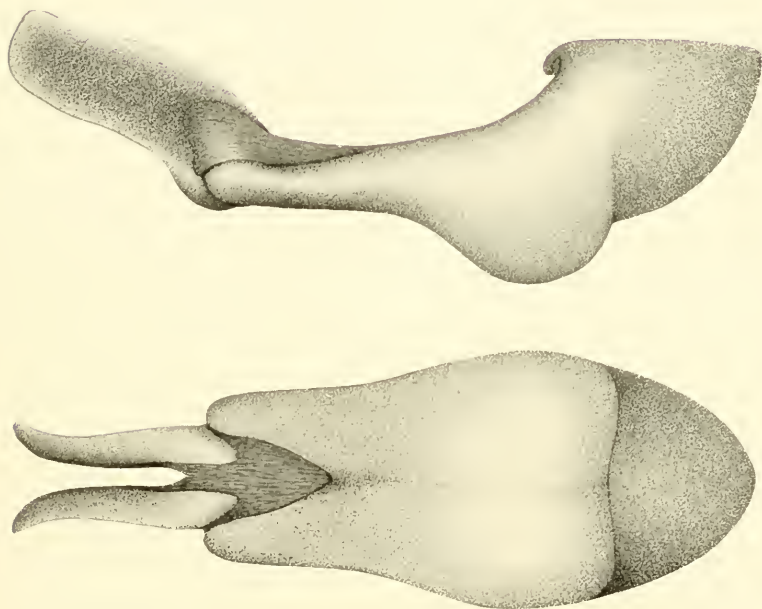






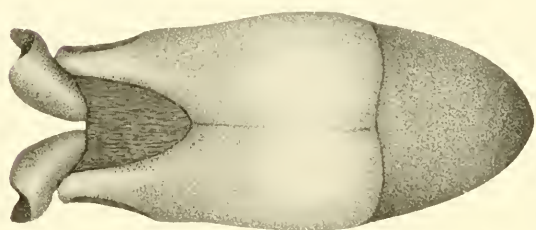
SERICA ASPERA, DAWSON.





SERICA DELICATA, DAWSON.

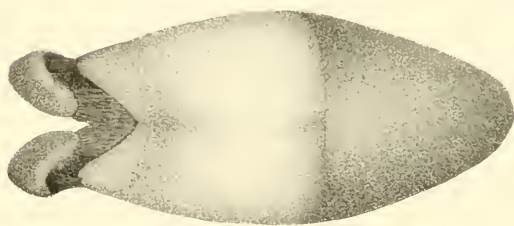




SERICA TANTULA, DAWSON.

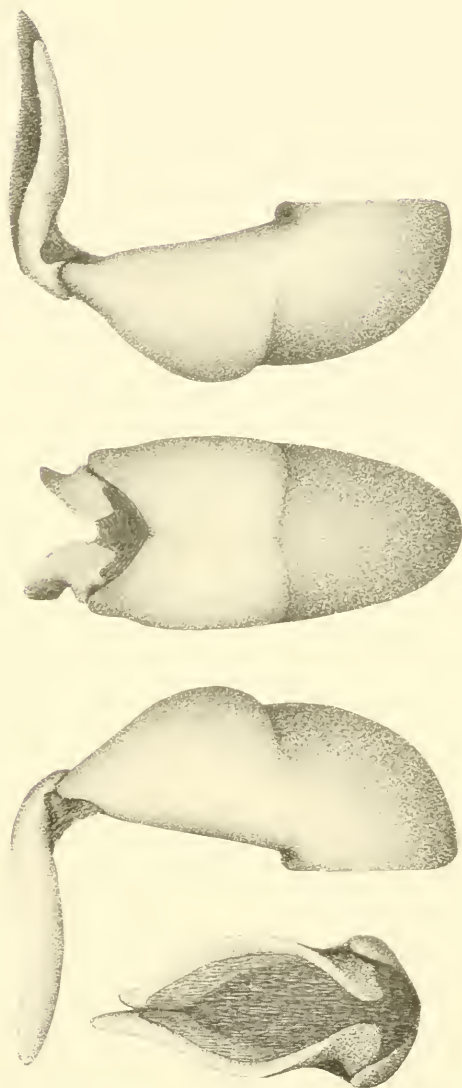






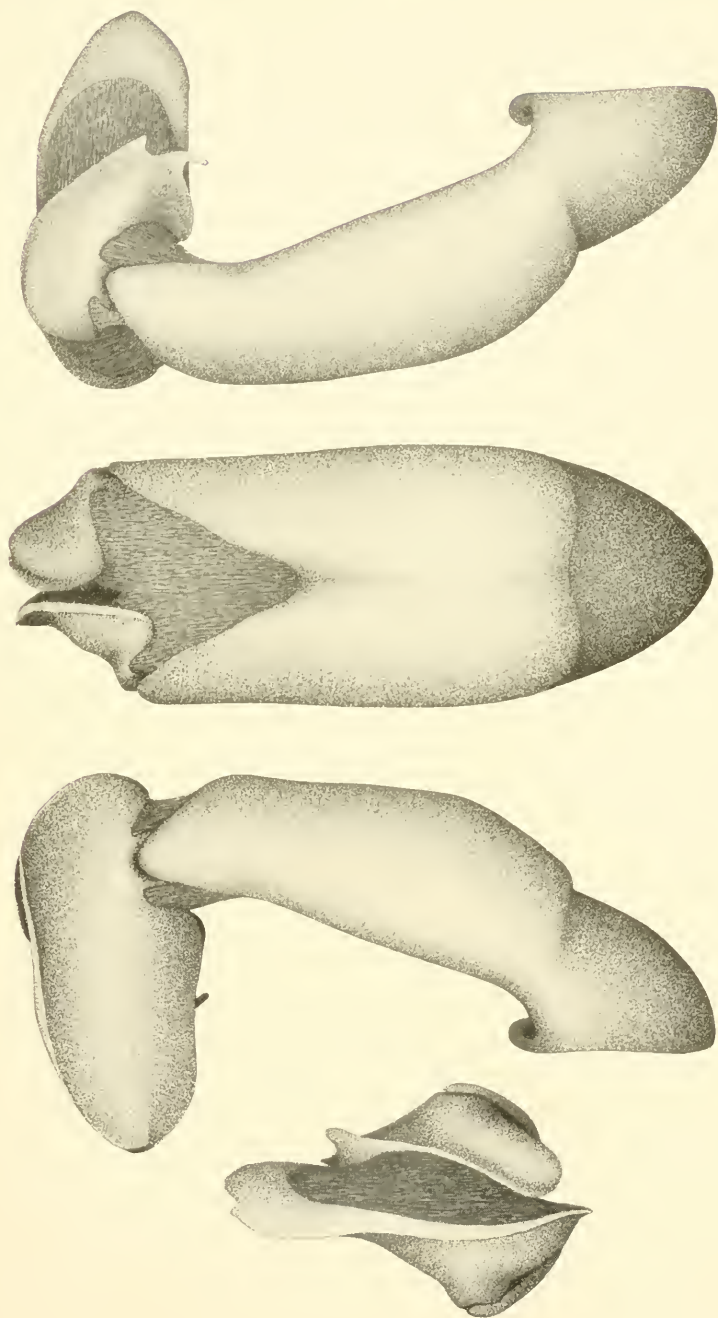
SERICA PUSILLA, DAWSON.





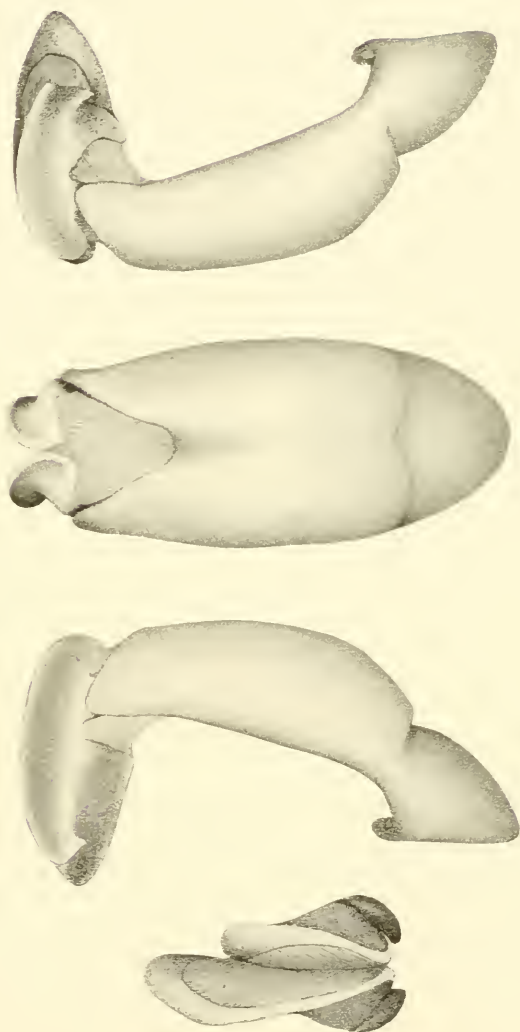
SERICA SCULPTILIS, DAWSON.





SERICA SOLITA, DAWSON.

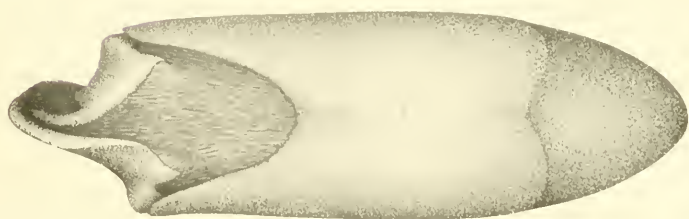




SERICA ELONGATULA, HORN.

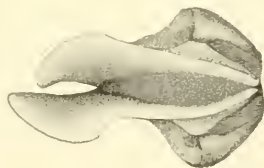
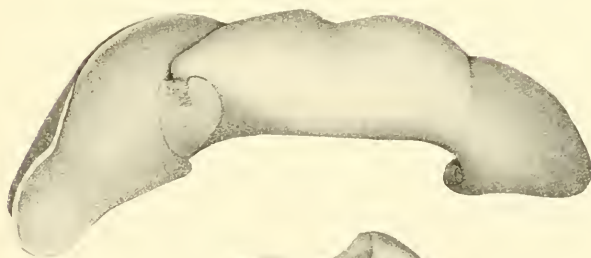
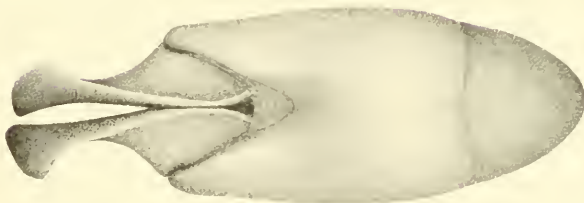






SERICA MIXTA, LECONTE.





SERICA CURVATA, LECONTE.



Washington: "Washington Territory," 7 ♂; Spokane Falls, 1 ♂; Pullman, 4 ♂, 1 ♀.

CANADA:

Quebec: Lanoraie, 1 ♀.

Manitoba: Onah, 8 ♂; Aweme, 1 ♂.

British Columbia: 1 ♂, 1 ♀; Nelson, 1 ♂; Golden, 1 ♂; Nanaimo, Vancouver's Island, 1 ♂, 1 ♀; Peachland, 3 ♂, 7 ♀; Buccaneer Bay, 2 ♂, 1 ♀.

North West Territory: 1 ♂.

*Curvata* becomes larger and darker, and even develops a slight iridescence in the specimens from more mountainous portions of its range. These larger, darker specimens closely resemble *scrotina* Le Conte in appearance, and are usually so named in collections. The smaller, pallid specimens coming from the foothills and plains regions are not common in collections and have usually remained unnamed. With only a few specimens at hand the student would not, without the aid of the genital characters, correctly connect up the extremes of variation in size and color which occur in this species. The northwest Nebraska specimens (which presumably come from near the source of the type specimens) are quite typical. A dissected male bearing the data "Monroe Canyon, Sioux County, Nebraska, June 23, 1911 (R. W. Dawson)" was carefully matched up with the dissected holotype and used in preparing the drawings on the accompanying plate, and in taking the detailed measurements above given.

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## THE INSECTS AND PLANTS OF A MOIST WOODS ON THE PIEDMONT PLAIN OF NEW JERSEY.

BY HARRY B. WEISS AND ERDMAN WEST,

NEW BRUNSWICK, N. J.

The present paper deals with the results of a survey of the insects and plants found in a moist woods and adjoining thicket at Monmouth Junction, N. J. Collecting extended over the greater parts of 1920 and 1921 and during 1921 it took place at regular weekly intervals during the spring, summer and autumn. It is realized that collecting over two years is not exhaustive in so far as the insects are concerned.

Each season brings its own species to the front and species which are taken in numbers one year may be missing the next; in fact collecting varies from week to week and day to day. However it is thought that the records included in this paper represent about fifty per cent. of the species likely to be found in such a situation.

New Jersey is a portion of the Atlantic Slope of the United States and the boundary between the geographic and geologic provinces known as the Coastal Plain and Appalachian province extends obliquely across the state in nearly a straight line through Trenton and New Brunswick. Three of the four major divisions of the Appalachian province enter New Jersey, these being the Appalachian Valley, Appalachian Mountains and the Piedmont Plateau. In New Jersey the Appalachian Mountains form a belt known as the

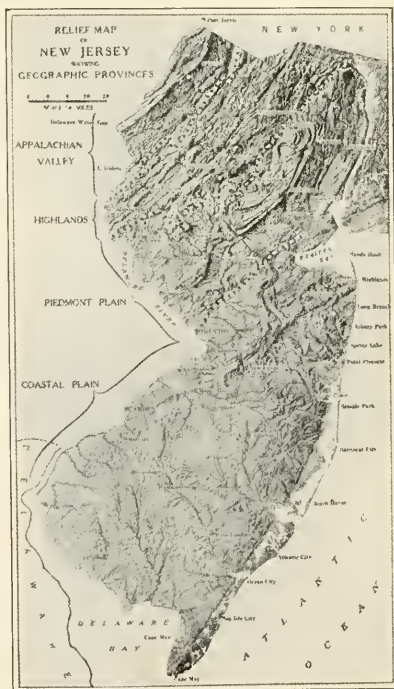


FIG. 1. Relief map of New Jersey showing geographic provinces (Dept. Cons. and Develop. N. J.).



Highlands and the Piedmont Plateau is called the Piedmont Plain. Figure 1 shows the geographic provinces of the state.

Monmouth Junction, where the survey was made, is located on the lower edge or border of the Piedmont Plain about ten miles below New Brunswick. This Plain is "chiefly a lowland of gently rounded hills separated by wide valleys with some ridges and isolated hills rising conspicuously above the general surface, which slopes gently from about 400 feet above sea level at its northwestern margin to about 100 feet along its southeastern border near the Delaware and to sea level about Newark Bay."<sup>1</sup>

The rocks of the different parts of the Piedmont Plain differ widely in age. The section surveyed lies very close to if not on the line separating the trap rock and shale formations. The shale is baked for some distance from the trap intrusion and its color and physical characteristics changed until it somewhat resembles trap rock. The soil towards the surface may be either washed from the trap rock hills at the back or may be partly broken down, baked shale.

Hollick<sup>2</sup> outlines three forest zones for New Jersey, the deciduous zone, the tension zone and the coniferous zone. The tension zone is bounded by an irregular line drawn from a little east of Metuchen to Trenton and a similar one from Long Branch to Salent. North of the first line will be found the typical deciduous region and south of the second line, the typical coniferous zone. Between the two lines is an area about sixteen miles wide "which may be termed the tension zone because it is there that the two floras meet and overlap, producing a constant state of strain or tension in the struggle for advantage." Within the limits of either the deciduous or coniferous zone, the typical characteristic species of each have become firmly established and conditions are more or less uniform. The forests of the Piedmont Plain are deciduous and according to Smith (*Insects of New Jersey*, p. 28) insect life is less abundant than to the north or south. Part of it is largely under cultivation and has many large swamp areas and low meadow regions.

The surveyed area consisted of about twenty-two acres of gently sloping, moist woods and thicket just above or on the southern border of the deciduous zone. The woods occupied about fifteen acres and

<sup>1</sup> Lewis and Kummel, *Bul. 14, Geol. Survey N. J.*, p. 28.

<sup>2</sup> *Ann. Rept. State Geol. N. J.*, 1899, pp. 177-201.

the adjoining thicket about seven acres. The exact location will be found on the map marked figure 2. This area is drained by tributaries of the Raritan River and lies in about latitude  $40^{\circ} 23' N.$  and

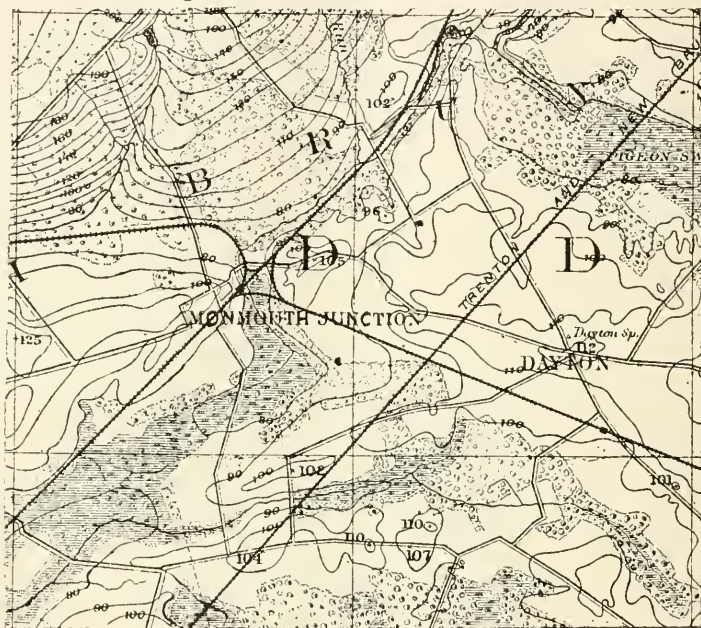


FIG. 2. Map of Monmouth Junction, N. J.; the letter B above the railroad branch curving up and to the left marks the exact spot where the survey was made.

longitude  $74^{\circ} 33' W.$ , at an altitude of 110 feet. The top soil of the woods and thicket, particularly of the woods, was very rich in humus and many low, wet spots occurred throughout the greater portion of the woods. As a rule the thicket was considerably drier. No streams were present in either the woods or thicket but the surrounding territory contained many swampy areas and several brooks. In view of this together with the dense shade, conditions in the woods were usually moist throughout the growing seasons. The flora of the area was typical of many of the numerous similar woods found in the Piedmont Plain. The ground was moist with many wet spots but seldom became swampy. The vegetation was consequently mesophytic

throughout. The plants were listed on weekly trips to the area during the year 1921, from March to October. The vegetation fell naturally into two more or less distinct series, the woods and thicket, depending on the presence or absence of large trees. The general aspect of the two series was quite similar in respect to actual species present but each had groups or successions that were characteristic.

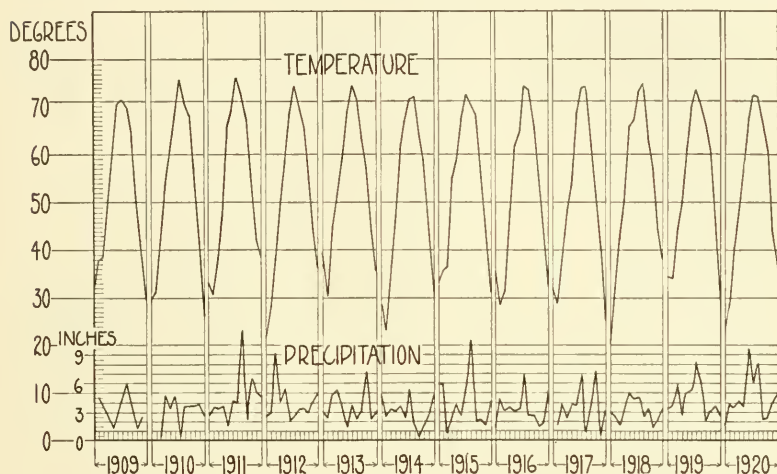


FIG. 3. Chart showing mean temperature and precipitation by months from 1909 to 1920 at New Brunswick, N. J., about ten miles from Monmouth Junction.

#### THE WOODS.

The flora of the woods may be divided into the following four groups: trees, shrubs, herbs and fungi. While numerous species were found in each group, the majority of individuals belonged to a few species which stood out from the remainder of the vegetation. Among the trees, the red maple (*Acer rubrum*) was the dominant species. This together with the oaks (*Quercus palustris*, *Q. rubra* and *Q. alba*) contributed over half the trees in the woods. Clumps of ironwood (*Carpinus caroliniana*) together with sweet gum (*Liquidambar styraciflua*) and the beech (*Fagus grandiflora*) added another quarter. Clumps of gray birch (*Betula populifolia*) in various stages of decay indicated that this species was an important element before the taller oaks and maples attained their maximum height and cut off

the sunlight required by the low growing birch. This was further demonstrated in the thicket where the birch was an important and vigorous element and the oaks and maples still small. The remainder of the trees consisted of scattered specimens of oaks, sour gums, hickories, etc., including a few sickly chestnuts (*Castanea dentata*). This species was formerly a conspicuous member in the tree flora but it has been almost entirely eliminated by the bark disease *Endothia parasitica*.

The shrubs included the viburnums with *Viburnum dentatum* as the most frequent; the spice bush (*Benzoin aestivale*); large clumps of elder (*Sambucus canadensis*) and in the more open places dense thickets of green briar (*Smilax rotundifolia*). Several species of *Rubus* with a scattering of other genera made up the remainder of the shrubs.

The herbaceous flora was distributed over a series beginning with a very rich and conspicuous vernal flora followed by a straggling succession that was marked by few important species. Before the trees expanded their leaves enough to form much shade, the floor of the woods was covered with a carpet of showy spring plants. These included the wood anemone (*Anemone quinquefolia*), spring beauty (*Claytonia virginica*), Indian Turnip (*Arisema trifolium*), several violets among which *Viola papilionacea* was prominent, early crow-foot (*Ranunculus fascicularis*) in the wet places and vast areas covered with May apple (*Podophyllum peltatum*) and the fawn lily (*Erythronium americanum*). In the more open spots the wild cranesbill (*Geranium maculatum*) was found. The other half of the flora included a great number of species of which over half belonged to the Liliales and the Ranunculales.

This vernal flora gradually ripened and disappeared as the leaf canopy of the trees reached its early summer density. Large patches of poison ivy (*Rhus toxicodendron*) and Virginia creeper (*Pseudocarya quinquefolia*), sometimes intermingled, covered much of the forest floor. In the dense shade neither species showed any tendency to climb. The moist spots were covered with the spotted touch-me-not (*Impatiens biflora*). In mid-summer, water hemlock (*Cicuta maculata*) was conspicuous on account of its white umbels. In late summer rattlesnake root (*Prenanthes alba*) became the most conspicuous species. The other plants making up the post-vernal flora were not

confined to any particular group. Only one fern, the sensitive fern (*Onoclea sensibilis*), which occurs in patches in wet places, was ever a conspicuous element.

Among the fungi most of the conspicuous forms belonged to the Polyporaceæ and Agaricaceæ in the order Agaricales. Much of the dead wood was occupied by such forms as *Polyporus versicolor*, *P. pargamensis*, *Dædalia quercina* and similar coriaceous species throughout the year. Of the soft fleshy plants in the Agaricaceæ, those belonging to the genera *Pleurotus*, *Pluteus*, *Russula*, *Lactarius*, *Collybia* and *Clitocybe* were the most conspicuous during the summer months.

#### THE THICKET.

The flora of the thicket was less sharply divided into groups than that of the woods but there were again present the trees, shrubs and herbs. In this area the fungus flora was negligible. As will be noted many of the characteristic plants of the tree and shrub groups in the woods held correspondingly important places here. The herbaceous flora presented an entirely new series with the exception of a few vernal plants.

The most important tree element in the thicket was the gray birch (*Betula populifolia*) which contributed about one third of the woody plants. The red maple (*Acer rubrum*) and the oaks (*Quercus rubra*, *Q. palustris*, *Q. alba*) followed next in importance and were the forerunners of the woods to follow. Patches of young sweet gums and a generous sprinkling of elm (*Ulmus americana*) completed the major tree elements.

The shrubs in the thicket did not contrast greatly with the trees due to the large number of individuals of the latter group present. However dwarf sumach (*Rhus copallina*), a typical shrub, was second numerically only to the gray birch among the woody plants. Almost impenetrable patches of blackberry (*Rubus alleghensis*) occupied the open spaces and green brier (*Smilax rotundifolia*) the more shaded places. There were also several large areas covered with hazelnut (*Corylus americana*). Three patches in almost pure stand of *Cornus paniculatus* were conspicuous in late spring for their white flowers and during the winter for their groups of slender wiry stems. These five species included at least half the individuals among the shrubs.



The herbaceous flora in the thicket was the most complicated of the three groups. It exceeded the other groups in number both of individuals and of species. It far exceeded the corresponding group in the woods. It began with a conspicuous vernal flora followed by a less well-defined early and late summer series and ended with a distinct and showy autumn group. The spring flowers included many of those found in the woods at this time such as *Claytonia virginica*, *Erythronium americanum*, *Geranium maculatum*, and *Anemone quinquefolia* with the addition a little later of tinker's weed (*Triosteum perfoliatum*) and cinquefoil (*Potentilla canadensis*). The little *Potentilla* remained after the other spring flowers had gone and its creeping stems with a few grasses and an occasional dewberry (*Rubus villosus*) covered the floor of the thicket throughout the growing season. Among the early summer flowers that followed the spring group were the primroses *Oenothera pumilla* and *O. pratensis*, loosestrife (*Lysimachia quadrifolia*), a very important but inconspicuous

## INSECTS OF THE WOODS (No. SPECIES).

Order.	Sifting.	In dead stumps under bark, etc.	Under stones.	In dead trees.	Flying or sweeping.	On flowers.	Galls.	Miners.	Fungous forms.	Aphids, scales.	Totals.
<i>Collembola</i> . . . . .	1								2		3
Ephemera . . . . .					1						1
Megaloptera . . . . .					1						1
Odonata . . . . .					4						4
Orthoptera . . . . .					3						3
Isoptera . . . . .		1									1
Coleoptera . . . . .	30	32	14	6	31	5	1		45		164
Thysanoptera . . . . .									1		1
Corrodentia . . . . .	1										1
Hemiptera . . . . .	3	3			8						14
Homoptera . . . . .					9					8	17
Neuroptera . . . . .					1						1
Trichoptera . . . . .					1						1
Lepidoptera . . . . .		1			38			4			43
Mecoptera . . . . .					1						1
Diptera . . . . .					41	3	9		3		56
Hymenoptera . . . . .	3	8	3		31	6	6				57
<i>Acarina</i> . . . . .	1						2		2		5
Totals . . . . .	39	45	17	6	170	14	18	4	53	8	374

ous element, the tick trefoils (*Desmodium canadense* and *D. paniculatum*), with a scattering of common milkweed (*Asclepias syriaca*) and yarrow (*Acillea millefolium*). Between this group and the autumn flowers was a period in which various plants with conspicuous flowers matured but they were so well distributed over a large number of species that not one stood out as more important than another. Of the whole number of these species half perhaps belonged to the order Polemoniales with the mints (Labiateæ) ranking as the most important family. These merged into the most showy

## INSECTS OF THE THICKET (NO. SPECIES).

Order.	Flying, sweeping.	In pool.	On flowers.	Galls.	Aphids.	In ants' nest.	Large ants' nests.	Totals.
Odonata.....	7							7
Orthoptera.....	6							6
Coleoptera.....	44	3	10			2		59
Hemiptera.....	23	1						24
Homoptera.....	20			1	5			26
Trichoptera.....	1							1
Lepidoptera.....	25							25
Mecoptera.....	1							1
Diptera.....	47			7				54
Hymenoptera.....	17		5	5			2	29
Acarina.....				1				1
Totals.....	191	4	15	14	5	2	2	233

## ADDITIONAL INSECTS COMMON TO BOTH WOODS AND THICKET (NO. SPECIES).

Order.	Flying or sweeping.	Galls.	On flowers.	Totals.
Odonata.....	1			1
Orthoptera.....	1			1
Coleoptera.....	10			10
Hemiptera.....	4			4
Homoptera.....	10			10
Neuroptera.....	2			2
Lepidoptera.....	8			8
Diptera.....	10	2		12
Hymenoptera.....	1	1	2	4
Totals.....	47	3	2	52



group of the season, the autumn plants including the asters and goldenrods. *Aster vimineus* was the most important though it was far less conspicuous than the less common purple *Aster novæ-anglicæ*. *Solidago rugosa* and *S. canadensis* were the most important of the goldenrods and they occupied about half of the area of the open places. Other plants noticeable at this time included the purple gerardia (*Gerardia purpurea*), joe pye weed (*Eupatorium purpureum*) and common thistle (*Cirsium lanceolatum*). The various grasses were not listed or identified because they were unimportant. A more complete list of the plants of the woods and thicket will be found at the end of the paper.

During the survey no attempt was made to connect up every species of insect with a definite plant host, consequently the results as outlined show, in a general way, only the species found in certain situations and indicate the relative importance of various groups in such situations. The following tables summarize the findings in the woods and thicket.

## RESULTS OF SIFTING IN THE WOODS.

Orders.	Families.	No. species.	Family habits.
<i>Collembola</i> .....	.....	1	Saprophagous
Coleoptera.....	Carabidæ.....	3	Predacious
	Silphidæ.....	1	Saprophagous
	Scydmaenidæ.....	1	Predacious
	Staphylinidæ.....	15	Predacious and saprophagous
	Pselaphidæ.....	1	Saprophagous
	Ptiliidæ.....	1	"
	Scaphidiidæ.....	2	"
	Anthicidæ.....	1	?
	Erotylidæ.....	1	Saprophagous
	Cryptophagidæ.....	1	"
	Colydiidæ.....	1	"
	Scarabæidæ.....	2	Saprophagous varied
Corrodentia.....	Psocidæ.....	1	Saprophagous
Hemiptera.....	Lygæidæ.....	3	Phytophagous
Hymenoptera....	Ceraphronidæ.....	1	
	Formicidæ.....	2	Varied
<i>Acarina</i> .....	Oribatidæ.....	1	Saprophagous and phytophagous
Total.....		39	

The following tables deal with the families represented in the various situations in the woods and thicket.

Most of the sifting was done around the bases of the larger trees and in the drier portions of the woods. Almost 80 per cent. of the species found in such situations belonged to the Coleoptera with the Staphylinidæ supplying the largest number in this order.

## IN DEAD STUMPS, UNDER BARK, ETC., IN WOODS.

Orders.	Families.	No. species.	Family habits.
Isoptera.....	Termitidæ.....	1	Saprophagous
Coleoptera.....	Carabidæ.....	7	Predacious
	Staphylinidæ.....	2	Predacious and saprophagous
	Histeridæ.....	1	Predacious
	Lampyridæ.....	1	"
	Elateridæ.....	3	Saprophagous, varied
	Ostomidæ.....	1	Predacious and saprophagous
	Nitidulidæ.....	2	Predacious, varied
	Cucujidæ.....	3	" "
	Erotylidæ.....	1	Saprophagous
	Colydiidæ.....	1	"
	Mycetadidæ.....	2	"
	Tenebrionidæ.....	5	"
	Melandryidæ.....	1	"
	Lucanidæ.....	1	"
	Scolytidæ.....	1	Phytophagous
Hemiptera.....	Aradidæ.....	2	Saprophagous
	Anthocoridæ.....	1	?
Lepidoptera....	Noctuidæ.....	1	Saprophagous
Hymenoptera...	Formicidæ.....	6	Saprophagous, varied
	Halictidæ.....	2	Pollenizers
Total.....		45	

Dead trees, stumps, fallen limbs, etc., were plentiful in the woods and such habitations yielded 45 species, with the Coleoptera supplying about 73 per cent. of them. The remainder was made up mostly by

## UNDER STONES IN WOODS.

Orders.	Families.	No. species.	Family habits.
Coleoptera.....	Carabidæ.....	13	Predacious
	Tenebrionidæ.....	1	Saprophagous
Hymenoptera...	Formicidæ.....	3	Saprophagous, varied
Total.....		17	

termites and ants. The one species in the Lepidoptera consisted of the noctuid *Scolecocampa liburna* Geyer whose larva lives in decayed wood. In the Hymenoptera, *Halictus pura* (Say) and a species of *Chloralictus* were taken from a dead birch stump where they were nesting.

In one of the drier upper portions of the woods were comparatively small stones and the 17 species, mostly of Coleoptera, were collected under them.

#### IN DEAD TREES IN THE WOODS.

Orders.	Families.	No. species.	Family habits.
Coleoptera.....	Melasiidæ.....	1	Saprophagous
	Mycetophagidæ...	1	"
	Anobiidæ.....	1	"
	Curculionidæ.....	2	Phytophagous
	Scolytidæ.....	1	"
Total.....		6	

Dead trees, particularly standing or recently fallen ones which had not started to decay, yielded *Isorhipis ruficornis* (Say) and *Ptilinus ruficornis* Say both of which were fairly numerous in dead red maple where they develop. The dead hickories were infested by *Cryptorhynchus obtentus* (Hbst.), the ash by *Leperisinus aculeatus* (Say), and from dead oaks *Stenoscelis brevis* (Boh.) was taken.

The 170 species listed above were taken by being captured in flight or by sweeping the vegetation on the ground, the shrubs and low tree branches. The Diptera supplied the largest number of species, namely 24 per cent. of the total number, and was followed by the Lepidoptera with 22 per cent., the Coleoptera with 18 per cent. and the Hymenoptera also with 18 per cent. The numerous families represented in these orders are shown above. Several species of Microlepidoptera as yet unidentified were collected and many others observed.

## TAKEN FLYING OR SWEEPING IN THE WOODS.

Orders.	Families.	No. species.	Family habits.
Ephemera		1	Predacious
Megaloptera	Sialididae	1	
Odonata	Agonidae	4	Predacious
Orthoptera	Tettigoniidae	2	Phytophagous
	Gryllidae	1	"
Coleoptera	Cicindelidae	1	Predacious
	Carabidae	3	"
	Staphylinidae	2	Saprophagous and predacious
	Histeridae	1	Predacious
	Cantharidae	3	Predacious
	Elateridae	2	Saprophagous
	Melandryidae	1	"
	Scarabaeidae	2	"
	Cerambycidae	6	Phytophagous
	Chrysomelidae	7	"
	Curculionidae	3	"
Hemiptera	Pentatomidae	1	Predacious and phytophagous
	Coreidae	1	Phytophagous
	Lygaeidae	1	"
	Nabidae	1	Predacious
	Miridae	4	Phytophagous
Homoptera	Membracidae	2	"
	Cicadellidae	6	"
	Fulgoridae	1	"
Neuroptera	Mantispidae	1	Parasitic
Trichoptera		1	Phytophagous
Lepidoptera	Papilionidae	1	"
	Pieridae	1	"
	Nymphalidae	1	"
	Lycenidae	1	"
	Hesperiidae	2	"
	Arctiidae	1	"
	Noctuidae	11	"
	Drepanidae	2	"
	Geometridae	11	"
	Limacodidae	2	"
	Pyrallidae	3	"
	Tortricidae	1	"
	Adelidae	1	"
Mecoptera	Panorpidae	1	?
Diptera	Chironomidae	2	Saprophagous, etc.
	Culicidae	3	" "
	Mycetophilidae	2	Saprophagous
	Stratiomyidae	1	"
	Tabanidae	1	Predacious, etc.
	Leptidae	2	" "
	Asilidae	2	" "
	Dolichopodidae	1	" "
	Empididae	4	" "
	Pipunculidae	1	?
	Syrphidae	7	Saprophagous
	Tachinidae	2	Parasitic

Orders.	Families.	No. species.	Family habits.
Diptera, <i>Cont.</i> ..	Muscidae.....	1	Saprophagous
	Anthomyidae.....	2	Phytophagous, etc.
	Scatophagidae.....	3	Saprophagous
	Sciomyzidae.....	2	?
	Sapromyzidae.....	4	Saprophagous
Hymenoptera...	Trypetidae.....	1	Phytophagous
	Tenthredinidae.....	2	"
	Oryssidae.....	1	" "
	Braconidae.....	1	Parasitic
	Banchidae.....	1	"
	Ichneumonidae.....	14	"
	Cynipidae.....	1	Phytophagous
	Pteromalidae.....	1	Parasitic
	Psammocharidae...	2	Predacious
	Eumenidae.....	1	"
	Vespidae.....	2	"
	Sphecidae.....	2	"
	Apoidea.....	1	Pollenizer
	Andrenidae.....	1	"
	Apidae.....	1	"
Total.....		170	

## ON FLOWERS IN WOODS.

Orders.	Families.	No. species.	Family habits.
Coleoptera.....	Mordellidae.....	1	Saprophagous
	Buprestidae.....	1	Phytophagous
	Scarabæidae.....	1	Saprophagous, varied
	Cerambycidae.....	1	Phytophagous
	Curculionidae.....	1	"
Diptera.....	Chironomidae.....	1	Saprophagous, etc.
	Syrphidae.....	1	"
	Anthomyidae.....	1	Phytophagous
Hymenoptera...	Formicidae.....	1	Varied
	Sphecidae.....	1	Predacious
	Andrenidae.....	1	Pollenizer
	Ceratinidae.....	1	"
	Apidae.....	2	"
Total.....		14	

With the exception of the spring flowers which were very ephemeral and a few late asters, there were almost no flowers in the woods and this accounts for the small number of flower visitors.

## GALLS IN THE WOODS.

Orders.	Families.	No. species.	Family habits.
Coleoptera.....	Buprestidæ.....	1	Phytophagous
Diptera.....	Itonididæ.....	9	"
Hymenoptera...	Cynipidæ.....	6	"
<i>Acarina</i> .....	Eriophyidæ.....	2	"
Total .....		18	

Eighteen species of galls were fairly common and further searching would have undoubtedly added additional species especially in the Hymenoptera.

## LEAF MINERS IN THE WOODS.

Order.	Family.	No. species.	Family habits.
Lepidoptera....	Tineidæ.....	4	Phytophagous
Total.....		4	

## FUNGOUS INSECTS IN THE WOODS.

Orders.	Families.	No. species.	Family habits.
<i>Collembola</i> .....		2	Saprophagous
Coleoptera.....	Silphidæ.....	1	"
	Staphylinidæ.....	10	Predacious, saprophagous
	Histeridæ.....	1	Predacious
	Scaphidiidæ.....	1	Saprophagous
	Dasyllidæ.....	1	" ?
	Ostomidæ.....	1	Predacious, varied
	Nitidulidæ.....	7	" "
	Erotylidæ.....	3	Saprophagous
	Cryptophagidæ....	1	"
	Colydiidæ.....	1	"
	Endomychidæ.....	1	"
	Tenebrionidæ.....	3	"
	Melandryidæ.....	2	"
	Anobiidæ.....	2	"
	Cisidæ.....	9	"
	Anthribidæ.....	1	"
Thysanoptera...		1	"
Diptera.....	Tipulidæ.....	1	"
	Mycetophilidæ....	1	"
	Ortalidæ.....	1	"
<i>Acarina</i> .....	Oribatidæ.....	2	"
Total.....		53	

The rich fungus flora consisted mainly of polypores thriving on the many trees and stumps in various stages of decay and numerous species of gill fungi supported by the moist forest soil. Of the 53 species of insects collected, the Coleoptera supplied the major portion. Undoubtedly, the Mycetophilidæ in the Diptera would have been better represented had it been possible to breed out the fungus gnats infesting the gill fungi.

SCALES AND APHIDS IN THE WOODS.

Order.	Families.	No. species.	Family habits.
Homoptera.....	Coccidæ.....	2	Phytophagous
	Aphididæ.....	6	"
Total.....		8	

From a pool in the woods which later dried up, a specimen of *Hydrophilus obtusatus* Say (Col.) was taken on April 6.

IN THE THICKET POOL.

Orders.	Families.	No. species.	Family habits.
Coleoptera.....	Dytiscidæ.....	3	Predacious
Hemiptera.....	Gerridæ.....	1	"
Total.....		4	

Collecting in the thicket was slightly better than in the woods insofar as sweeping was concerned. Here the Coleoptera supplied 23 per cent. of the species, the Lepidoptera 13 per cent., the Hymenoptera 9 per cent., the Diptera 24 per cent., the Homoptera 10 per cent. and the Hemiptera 12 per cent. The two last named orders were comparatively unimportant in the woods but came into more prominence in the thicket.



## TAKEN FLYING OR SWEEPING IN THE THICKET.

Orders.	Families.	No. species.	Family habits.
Odonata.....	Agrionidae.....	2	Predacious
	Libellulidae.....	5	"
Orthoptera.....	Tettigidae.....	1	Phytophagous
	Tettigoniidae.....	2	"
	Gryllidae.....	3	"
Coleoptera.....	Carabidae.....	1	Predacious
	Cantharidae.....	3	"
	Elaterridae.....	2	Saprophagous, phytophagous
	Buprestidae.....	9	Phytophagous
	Colydiidae.....	1	Saprophagous
	Phalacridae.....	1	"
	Coccinellidae.....	2	Predacious
	Scarabaeidae.....	1	Saprophagous, phytophagous
	Cerambycidae.....	3	Phytophagous
	Chrysomelidae.....	13	"
	Mylabridae.....	1	"
	Curculionidae.....	7	"
Hemiptera.....	Cydnidae.....	1	?
	Pentatomidae.....	4	Phytophagous, predacious
	Neididae.....	1	Phytophagous
	Lygaeidae.....	2	"
	Tingitidae.....	1	Phytophagous
	Phymatidae.....	1	Predacious
	Reduviidae.....	1	"
	Miridae.....	12	Phytophagous
Homoptera.....	Cercopidae.....	1	"
	Membracidae.....	6	"
	Cicadellidae.....	11	"
	Fulgoridae.....	1	"
	Chermidae.....	1	"
Trichoptera.....	Phryganeidae.....	1	?
Lepidoptera.....	Satyridae.....	2	Phytophagous
	Nymphalidae.....	3	"
	Hesperiidae.....	5	"
	Saturniidae.....	1	"
	Arctiidae.....	1	"
	Noctuidae.....	3	"
	Notodontidae.....	1	"
	Geometridae.....	2	"
	Pyralidae.....	5	"
	Haploptiliidae.....	1	"
	Nepticulidae.....	1	"
Mecoptera.....	Panorpidae.....	1	?
Diptera.....	Tipulidae.....	1	Saprophagous
	Culicidae.....	2	"
	Tabanidae.....	4	Predacious
	Leptidae.....	1	"
	Bombyliidae.....	2	Parasitic
	Asilidae.....	4	Predacious
	Dolichopodidae.....	5	Adults predacious
	Empididae.....	3	Predacious
	Syrphidae.....	5	Saprophagous

Orders.	Families.	No. species.	Family habits.
Diptera <i>Cont.</i> ...	Tachinidæ.....	8	Parasitic
	Sarcophagidæ.....	1	Parasitic, saprophagous
	Anthomyidæ.....	2	Phytophagous, etc.
	Sapromyzidæ.....	2	Saprophagous
	Trypetidæ.....	3	Phytophagous
	Sepsidæ.....	1	Saprophagous
	Oscinidæ.....	2	Phytophagous
	Agromyzidæ.....	1	"
	Tenthredinidæ.....	3	"
	Vipionidæ.....	1	Parasitic
Hymenoptera...	Braconidæ.....	1	"
	Ichneumonidæ.....	3	"
	Serphidæ.....	1	"
	Formicidæ.....	1	Varied
	Eumenidæ.....	2	Predacious
	Vespidæ.....	2	Predacious, etc.
	Sphecidæ.....	2	" "
	Megachilidæ.....	1	Pollenizers
Total.....		191	

## ON FLOWERS IN THE THICKET.

Orders.	Families	No. species.	Family habits.
Coleoptera.....	Melyridæ.....	1	Predacious
	Ædemeridæ.....	1	?
	Mordellidæ.....	2	Saprophagous, varied
	Elateridæ.....	1	" phytophagous
	Melandryidæ.....	1	Saprophagous
	Scarabæidæ.....	1	Saprophagous, varied
	Cerambycidæ.....	3	Phytophagous
Hymenoptera...	Tenthredinidæ.....	1	"
	Chalcididæ.....	1	Parasitic
	Andrenidæ.....	2	Pollenizers
	Xylocopidæ.....	1	"
Total.....		15	

## GALLS IN THE THICKET.

Orders.	Families.	No. species.	Family habits.
Homoptera.....	Aphididæ.....	1	Phytophagous
Diptera.....	Itonididæ.....	6	"
Hymenoptera...	Cynipidæ.....	5	"
<i>Acarina</i> .....	Eriophyidæ.....	1	"
Diptera.....	Trypetidæ.....	1	"
Total.....		14	

Six species of Aphididæ were found in the thicket on such plants as goldenrod, birch, witch hazel, elm and willow. *Hamamelistes spinosus* Shimer was very abundant on young birch and did considerable damage.

In the open and semi-open spaces of the thicket, *Formica exsectoides* Forel had constructed large mounds and the inhabitants swarmed over much of the nearby vegetation. Some of the mounds were 21 inches high and 4 feet in diameter at the base. In the dense portions of the thicket, what appeared to be abandoned mounds of *exsectoides* were noted. These were more or less grass covered and contained small colonies of *Lasius umbratus minutus* in

ADDITIONAL SPECIES FOUND IN BOTH WOODS AND THICKET.

Orders.	Families.	No. species.	Family habits.
Odonata.....	Agriionidæ.....	1	Predacious
Orthoptera.....	Tettigoniidæ.....	1	Phytophagous
Coleoptera.....	Lycidæ.....	1	Saprophagous
	Lampyridæ.....	1	Predacious
	Buprestidæ.....	2	Phytophagous
	Chrysomelidæ.....	5	"
	Curculionidæ.....	1	"
Hemiptera.....	Pentatomidæ.....	2	Phytophagous, predacious
	Lygæidæ.....	1	Phytophagous
	Reduviidæ.....	1	Predacious
Homoptera.....	Cicadidæ.....	1	Phytophagous
	Cercopidæ.....	1	"
	Membracidæ.....	1	"
	Cicadellidæ.....	5	"
	Fulgoridæ.....	2	"
	Chermidæ.....	(Several not det.)	"
Neuroptera.....	Chrysopidæ.....	2	Predacious
Lepidoptera.....	Nymphalidæ.....	1	Phytophagous
	Lycenidæ.....	2	"
	Hesperiidæ.....	1	"
	Saturniidæ.....	1	"
	Pyrallidæ.....	1	"
	Eucosmidæ.....	1	"
	Heliozelidæ.....	1	"
Diptera.....	Tipulidæ.....	2	Saprophagous
	Culicidæ.....	2	Saprophagous
	Dolichopodidæ.....	2	Adults predacious
	Syrphidæ.....	1	Saprophagous
	Scatophagidæ.....	1	"
	Sciomyzidæ.....	2	?
Hymenoptera...	Tenthredinidæ.....	1	Phytophagous
Total.....		47	

the galleries of which were collected aphids which Prof. Gillette thought might represent a new species of *Thecabius*. Two species of Staphylinidæ, namely *Atheta nigrītula* Grav. and *Tachyporus nitidulus* Fab., were found in the nests of *exsectoides*.

In addition to the above, *Gryllus assimilis luctuosus* Serv. was found on the ground of both woods and thicket. The grape filbert gall *Schizomyia coryloides* Walsh & Riley and the ironwood leaf fold gall *Cecidomyia pudibunda* O.S. were also noted in both areas. In the Hymenoptera, *Andrena carlini* Ckll. was taken while flying in the woods on April 14 and also while visiting *Salix discolor* catkins in the thicket on March 28. *Halictus pura* Say visited dogwood flowers in the thicket on April 25 and cranesbill flowers in the woods on May 7. The blackberry seed gall *Diastrophus cuscute-formis* O.S. was common in the thicket and to a less extent in the woods.

#### SUMMARY.

The amount and character of insect injury to the trees and plants in the woods and thicket varied considerably but in most instances it appeared to be a negligible incident in the life of the plant. During the season of 1921, only the birches in the thicket were seriously injured. During the early summer they were attacked by plant lice and later by the birch leaf skeletonizer *Bucculatrix canadensiella* Cham. (Lep.). By the end of summer they appeared fire-swept. In the woods, the few remaining birches were rapidly disappearing under the combined attacks of *Polyporus betulinus* and the bronze birch borer *Agrilus anxius* Gory.

The foregoing tables show that a mixed forest with shrubby and herbaceous growths of various kinds supports a varied insect fauna. Some of the insects feed on the foliage, others live in the rotting wood of fallen limbs and trees, others upon the polypores and gill fungi found in such situations and others are parasitic or predaceous upon both injurious and beneficial forms. In this way a natural balance is preserved. The following table shows the comparative abundance of various types of food habits of the species taken. While some of the species may be wrongly classified due to ignorance of their correct food habits, yet the tables show in a general way the predominating types in the situations surveyed.

## TYPES OF FOOD HABITS.

Situation.	Phyto- phagous, No. species.	Sapro- phagous, No. species.	Predacious, No. species.	Parasitic, No. species.	Pollen- izers, No. species.	Totals
WOODS						
Sifting.....	3	30	4			37
In dead stumps, etc.....	1	24	17		2	44
Under stones.....		4	13			17
In dead trees....	3	3				6
Flying or sweeping	111	37	39	20	3	210
Flower visitors...	4	4	1		6	15
Galls and leaf miners.....	25					25
Fungous forms...		44	9			53
Scales and aphids	8					8
Totals.....	155	146	83	20	11	415
Per cent. of total...	37	35	20	5	3	100
THICKET						
Pool.....			4			4
Flying or sweeping	148	21	45	18	1	233
On flowers.....	4	5	1	1	5	16
Galls.....	14					14
Aphids.....	6					6
Totals.....	172	26	50	19	6	273
Per cent. of total...	63	9	19	7	2	100

Thus in the woods about 37 per cent. of the species were phytophagous, about 35 per cent. saprophagous, and this percentage appears reasonable in view of the dead timber and moist conditions; 20 per cent. consisted of predaceous species, 5 per cent. of parasitic species, etc. The 5 per cent. for parasitic forms is probably low and could have been increased by more diligent collecting of the small parasitic species in the Hymenoptera.

In the thicket 63 per cent. of the species collected were phytophagous, 9 per cent. saprophagous, 19 per cent. predaceous, etc. The large percentage of phytophagous forms appears to be due to the larger herbaceous flora of the thicket, the presence of more sunlight and warmth and the absence of conditions which would support saprophagous insects.

## ACKNOWLEDGMENTS.

The determinations were made by the following specialists whose generous coöperation made the preparation of this paper possible: Frank E. Watson, Lepidoptera; C. A. Frost, many determinations in the Coleoptera; Howard Notman, Staphylinidae and obscure families of Coleoptera; Wm. G. Dietz, crane flies; C. P. Gillette, plant lice; M. R. Smith, ants; C. E. Olsen, Homoptera, except scale insects and plant lice; Chas. W. Johnson, Diptera; Henry L. Viereck, Hymenoptera; H. G. Barber, Hemiptera; W. T. Davis, some of the Orthoptera; Nathan Banks, Neuroptera, Acarina, etc.

## LIST OF PLANTS AND INSECTS OF SURVEYED AREA.

On account of the expense connected with the printing of long lists of scientific names, it was necessary to omit from this paper the detailed list of the plants and insects found or noted during the survey. However a typewritten copy of this list together with a copy of this paper have been deposited in the library of The American Museum of Natural History, New York, N. Y.

## EXPLANATION OF PLATES XXIV, XXV, XXVI.

## PLATE XXIV.

FIG. 1. A winter view of the thicket showing the dense growth of young trees.

FIG. 2. Entrance to one of the grassy, open spaces in the thicket.

FIG. 3. A clump of birches still surviving in open portions of the woods.

FIG. 4. Winter view of thicket showing surviving cedars.

FIG. 5. A winter view of the woods showing type of tree growth.

FIG. 6. A winter view of the woods showing stumps and logs succumbing to attacks by Polypores.

## PLATE XXV.

FIG. 7. A dense portion of thicket showing clump of birches and group of May apples.

FIG. 8. Spring view of woods showing early ground flora.

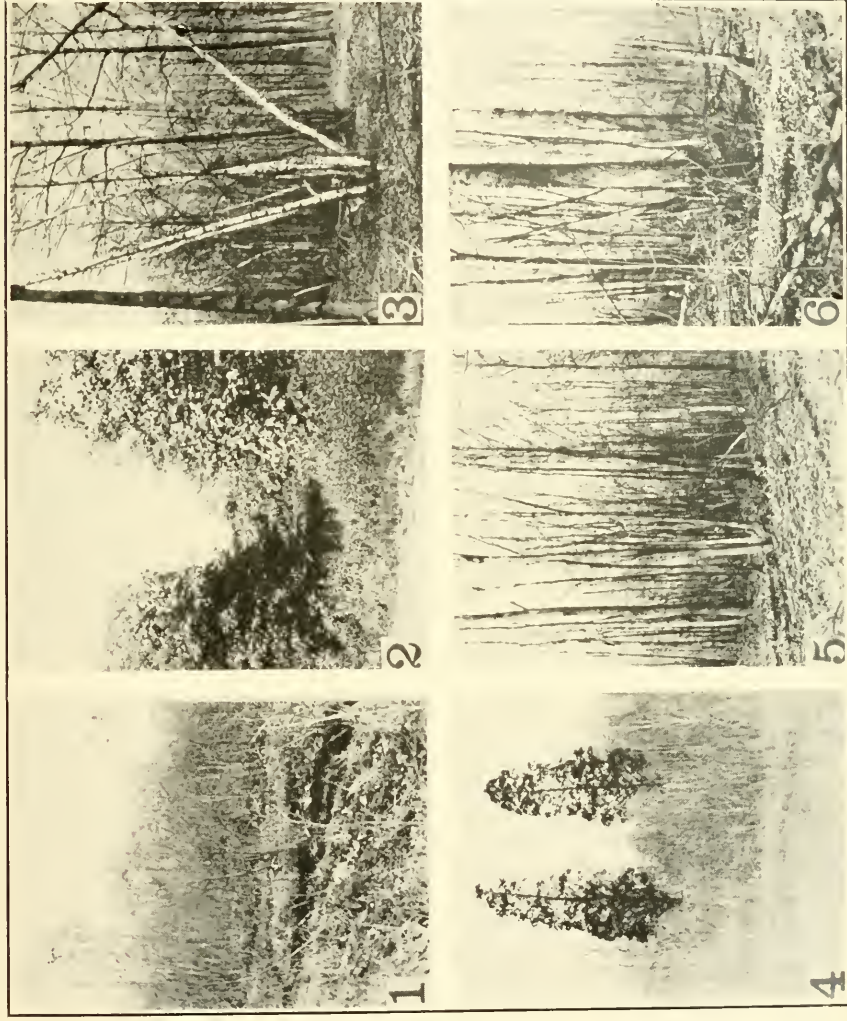
FIG. 9. View of thicket showing dense growth of young trees.

FIG. 10. One of the many wet spots in the woods with decayed tree at right.

FIG. 11. A pool in the thicket.

FIG. 12. A spring view of the floor of the woods.





INSECTS OF A MOIST WOODS.

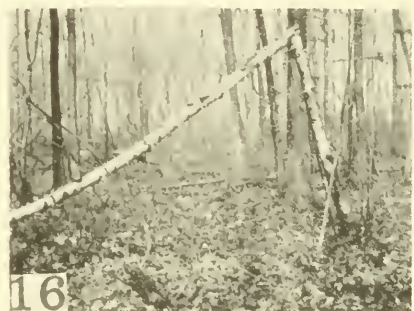
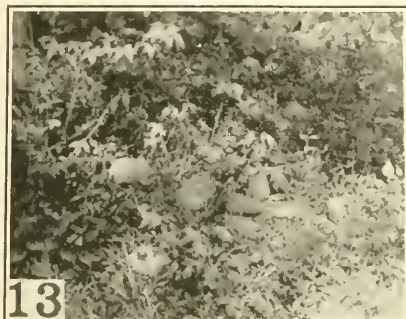






INSECTS OF A MOIST WOODS.





INSECTS OF A MOIST WOODS.



## PLATE XXVI.

FIG. 13. Stony ground in the upper end of the woods.

FIG. 14. Log on ground in woods showing sporophores of *Collybia platyphylla* and other fungi.

FIG. 15. Fallen trees and branches covered the floor of the woods in many places.

FIG. 16. Dead birch in woods attacked by *Polyporus betulinus*.

FIG. 17. Nest of *Formica exsectoides* found in some of the open spaces of the thicket.

FIG. 18. Dead trees in the woods showing sporophores of various fungi.

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THE MALE OF CYMATODERA HORNI  
(CLERIDÆ; COL.).

BY A. B. WOLCOTT,

FIELD MUSEUM OF NATURAL HISTORY, CHICAGO, ILL.

A male specimen of *Cymatodera horni* Wolc. has very recently come into my possession. My sincere thanks are due Mr. Chas. Liebeck who, recognizing that this sex was not represented amongst my material, with great generosity presented me with a fine specimen of that sex. As the male has never been described, and as it was entirely unknown to me in nature, I could not include characters enabling its identification in the table of the species of *Cymatodera* (Proc. U. S. Nat. Mus., LIX, 1921, pp. 284-288) I hasten to record the characteristics of this sex, that the necessary additions may be made to the above-mentioned table, thus rendering it more complete.

The male of *Cymatodera horni* agrees with the female in having the elytral apices rounded, differing thus from *Cymatodera californica* in which both sexes have the elytral apices sinuate and the sutural angle sometimes prolonged. *C. horni* has the sides of the elytra very nearly truly parallel, more so than in the female of the same species, but the latter sex has the apical third of the elytra more strongly obliquely narrowed to the apex: The sides of the elytra are in the male of *C. californica* distinctly divergent posteriorly.

*Cymatodera horni* and *Cymatodera californica* are certainly very closely allied species, resembling each other so closely in form, size,



sculpture and color that examined superficially they would promptly be placed as but a single species. I am of the opinion, however, that *C. horni* is entitled to stand as a valid species, even though I have been unable to find any characters of apparent specific value other than the rounded elytral apices, the somewhat feebly different secondary sexual characters of the terminal abdominal somites and the rather dubious one of the form of the elytra; these in the aggregate, however, seem to be of sufficient weight to establish its specific validity. It may be well to remark in passing that in all specimens of *C. horni* that I have examined the median elytral fascia is quite distinct, much more so than in *C. californica*, and is of a more vivid red than in the latter species.

In order to facilitate comparison of the secondary sexual characters of the abdomen as observed in the male of *C. horni* and *C. californica* the following detailed descriptions are presented:

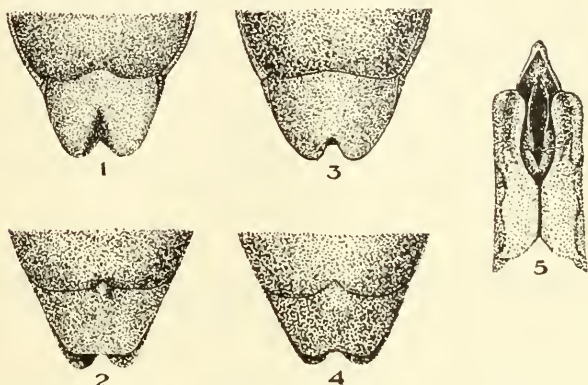
*Horni* has the fifth dorsal distinctly sinuate at apex with a pair of small, round, deep, medio-apical impressions (these perhaps adventitious); the sixth dorsal is much broader than long, its sides feebly, evenly rounded to apex, the latter rounded with a deep triangular emargination at middle, giving the apex the appearance of being bilobed, the surface is deeply excavated at middle from the apex to about the middle of the segment (text-figure 1). Fifth ventral broadly, feebly rounded at apex, the latter with a small but distinct excision at middle; sixth ventral wider at base than the corresponding dorsal, its sides nearly straight and strongly converging to the truncate apex, which is a little shorter than the sixth dorsal, the surface moderately and narrowly elevated medio-basally (text-figure 2).

*Californica* has the fifth dorsal broadly arcuate at apex; sixth dorsal one fourth broader than long, its sides a little more strongly rounded than in *horni*, apex rounded with a deep sub-parabolic excision at middle, the excavated area at apex of this excision very limited in extent (text-figure 3). Fifth ventral broadly rounded at apex, the latter deeply triangularly emarginate at middle; sixth ventral wider at base than last dorsal, its sides nearly straight, rather strongly narrowing to the broadly arcuate apex, which is shorter than the ultimate dorsal (text-figure 4).

*Cymatodera horni* was founded upon a female specimen from the



Santa Rita Mountains, Arizona, 5,000–8,000 ft. The male from which the foregoing characters are derived is from Phoenix, Arizona; it is (No. 1230) in my collection and is designated as the allotype of the species.



TEXT-FIGURE. 1 and 2. *Cymatodera horni* Wolc., terminal dorsal and ventral segments of abdomen, male. 3 and 4. *C. californica* Horn, the same. 5. *C. horni* Wolc., edeagophore, dorsal view.

The allotype is 21.0 mm. in length; 5.5 mm. in width at widest part, one fourth from elytral apices, and exactly 5.0 mm. in width at the humeri.

In both *C. horni* and *C. californica* the lobes of the sixth dorsal segment are rather densely clothed with long, pale yellowish, posteriorly directed hairs; these are purposely omitted in the figures as their presence would serve to obscure the outline of the parts involved. The "median fascia" of the elytra is not median, properly speaking, but distinctly ante-median in both the present species.

Believing that an examination of the primary sexual characters of the male would reveal some distinctive features, I had the edeagophore removed from a specimen of *C. horni* and *C. californica*, but the results viewed from a taxonomical point proved very disappointing, as the organs were found to be practically identical in all details, with the exception that in *C. horni* the apex of the apicale is obtusely rounded while in *C. californica* the apex is somewhat conical; in both species the distal portion is feebly deflected.

Edeagophore of *C. horni*, dorsal view, text-figure 5.

The edeagophore of *C. horni* and *C. californica* is much broader than in the majority of the species at present placed in the genus *Cymatodera*, at least this is true of all those I have had the opportunity to examine, but the breadth (proportionately) is nearly equal in *C. sirpata* Horn, being but slightly less broad. In many of our species these organs are very slender, the apicale but slightly and very gradually broader basally, the clava being in some instances greatly exerted. In *C. baltcata* LeConte the distal portion of the apicale curves upward very strongly; this is the only species in which I have noticed this form of the apicale.

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## TWO NEW FORMS OF CICINDELA WITH REMARKS ON OTHER FORMS.

By W. KNAUS,

McPHERSON, KAN.

The McPherson Scientific Expedition consisting of H. H. Ninger, Head of the Department of Biology of McPherson College; Forest Hoover, his assistant, and the writer spent eight weeks during July and August, 1921, in Southern Wyoming, Southwest Utah, Southwest Nevada and Southern California.

Among the new species of Coleoptera collected were: one new variety and one new form of *Cicindela*:—

***Cicindela denverensis* Csy., propinqua**, new variety.

Similar in form and color to *denverensis* but smaller and with a shorter body. Color light green, with slight golden sheen on elytra except suture and elytral margin. Head and thorax similar to *denverensis*. The frontal declivity of head, the under sides of the thorax, and the legs covered with dense, erect, white vestiture. Sides of the abdominal segments sparsely clothed with decumbent white vestiture. Elytra without markings except a triangular dash of white at the apices. Length 9 mm, width 3.5 mm.

Ash Meadow, Nye County, Nevada. Altitude 2,050 feet, one specimen, a male, August 16, 1921. On mud at margin of stream. No other specimen seen in five days collecting. In the same vicinity were taken *Cicindela nevadica*, *C. tenuisignata*, *C. var. hæmorrhagica*,

*C. var. pacifica*, *C. var. bisignata*, *C. var. chihuahuæ* and *C. punctulata*.

The type locality is separated from the western limit of *denverensis* by the states of Nevada, Utah and half of Colorado.

*Denverensis* occurs in April and May and again in September and October while *propinqua* was taken the middle of August. *Denverensis* is taken at elevations of from 2,500 to 5,500 feet, much higher in altitude, it will be noted, than the type locality of *propinqua*.

***Cicindela pusilla* var. *imperfecta*, *continua*, new form.**

Same size and color as *imperfecta*, but differs in having the middle band, where it approaches the margin, extended and joining the marginal end of the apical lunule, thus making a continuous connection from the inner angulation of the humeral lunule to the tip of the apical lunule.

Specimens taken August 8, 1921, on the beach of Baldwin Lake near Pine Knot, San Bernardino Mountains, California, elevation 8,500 feet. No variations in the elytral markings were observed in the six specimens taken. Type and paratype in my collection and paratypes in the collection of McPherson College and Edwin A. Calder collection, Providence, Rhode Island.

At Ash Meadow, Nev., 16 miles northeast of Death Valley Junction, California, our expedition was fortunate in securing a fine series of the extremely rare *Cicindela nevadica*.

This species was described in 1871 by Leconte from a single specimen without a recorded locality in Nevada.

The type specimen is in the Leconte collection at Harvard University and an excellent figure of this species appeared in Schaupp's paper on North American Cicindelidæ, published in the bulletin of the Brooklyn Entomological Society for 1876. This with a single specimen in the Philadelphia Academy of Science collection were the only specimens known until August 21, 1919, when Mr. Morgan Hebard, of the Philadelphia Academy of Science, while collecting Orthoptera at Ash Meadow took ten specimens. He reported them as exceedingly wary and difficult to catch.

Our expedition reached Ash Meadow August 14 and made headquarters at the old Fairbanks ranch house on the north edge of the Meadow. About a half mile south of the home at the margin of a stream, fed by one of the numerous springs along the north

and east edge of the Meadow, we took our first specimen of *nevadica*; two other specimens were taken nearby. The next day by working further down the streams, other specimens were taken, and the succeeding four days by following the streams southward until they united into a single stream, the collecting became much better. The last day's work added as many specimens as the preceding four days combined.

*Nevadica* keeps very close to the water's edge, and in its flight will not leave the water for any distance. It frequently flies from one side of the stream to the other and would sometimes light in the edge of the water. They were not especially wary and were netted with comparative ease. A number of specimens were taken soon after transforming from pupæ, as the wing covers were not yet hardened nor the markings clearly defined.

Toward the north end of the Meadow on many of the streams, beaches or bars were charged with salt but lower down where the salt had disappeared, *nevadica* was found in greater numbers, an evidence that they were not confined to saline localities.

They were usually found associated with one or more species of the following:

*C. var. hæmorrhagica*, var. *pacifica*, var. *bisignata*, var. *chihuahua*, *punctulata* and *tenuisignata*.

Concerning the status of *Cicindela nevadica* var. *knausi*, I am inclined to believe *knausi* should have full specific standing. *Knausi* is found in southeast Kansas (salt marsh at Fredonia, Wilson County); Central Oklahoma (salt marsh region) and Lincoln, Neb. (*C. lincolniana* Csy.), extreme northern limit, southwestward to Santa Rosa, N. M., the extreme southwestern limit being recorded at Winslow, Ariz.

*Nevadica* is evidently confined to southwest Nevada and possibly to isolated localities across the line westward into California.

*Knausi* occurs in June and July, *nevadica* the latter part of July and August. It is a month later in approximately the same latitude and elevation in Kansas.

*Knausi* has complete elytral markings connected with a marginal white area. *Nevadica* has no marginal white area. The middle band in only one per cent. of specimens examined being connected

with a marginal white area, and in only 2 per cent. does the middle band tend to expand at the margin. The middle band of *knausi* drops backward, and the termination reaches the suture so far toward the apices that a line drawn from the marginal tips of the apical lunule of each elytron intersects the sutural terminations of the middle bands. In *nevadica* the backward extension of the middle band is much shorter, so that a line drawn as in *knausi* will come well below the sutural terminal of the middle band.

So far as observed *knausi* is always found on saline mud at the water's edge, while *nevadica* is much more abundant on moist mud not charged with saline matter.

The distribution and habits of *Cicindela fulgida* var. *parowana* Wickham are interesting.

This variety was first taken in August 1904 by H. F. Wickham near Little Salt Lake, seven miles northwest of Parowan, Utah. In 1917 a few specimens were taken by Geo. P. Englehart at Iron Springs, 15 miles northwest of Cedar City, Utah. On July 7, 1921, the McPherson Scientific Expedition took three specimens near the Beaver River, Milford, Utah, 50 miles northwest of Parowan. On July 24 and 25, a nice series was taken six miles northwest of Parowan about a mile from Little Salt Lake. There occurred only a few at each locality where found, usually around a reservoir filled from artesian wells and along the irrigation ditches leading out of the reservoirs. They were quite wary and were not easily taken. No specimens were found nearer than four miles northwest of Parowan.

Associated with *parowana* were *tranquebarica*, var. *imperfecta*, var. *chihuahuæ* and var. *echo*.

So far as known *parowana* has not been taken outside of Utah in the United States, but Mr. Chas. Liebeck of Philadelphia recently informed me that he had two specimens of this variety from Mr. J. B. Wallis of Manitoba, Canada, who took them in British Columbia. These specimens when examined proved to be typical *parowana*. This extends their habitat far to the north, and it is to be expected that this form will sooner or later be found in Idaho and Montana.

## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF JAN. 3.

A regular meeting of the New York Entomological Society was held at 8 P.M. on Jan. 3, 1922, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with 15 members and four visitors present.

Mr. Notman, for the Nominating Committee, recommended the reelection of the present officers and committees, as follows:

*President*—John D. Sherman, Jr.

*Vice-president*—Harry B. Weiss.

*Secretary*—Charles W. Leng.

*Treasurer*—W. T. Davis

*Curator*—Andrew J. Mutchler.

*Librarian*—Frank E. Watson.

*Del. to Council*—W. T. Davis.

*Executive Committee.*

H. G. Barber,

Geo. P. Engelhardt,

L. B. Woodruff,

Jos. Bequaert,

C. E. Olsen.

*Publication Committee.*

F. E. Lutz,

E. L. Dickerson,

Howard Notman—Chairman,

Chas. Schaeffer.

There being no other nomination, the Secretary cast an affirmative ballot, thereby completing their reelection.

Mr. Weiss proposed for active membership:

C. F. Curtis Riley, University of Manitoba, Winnipeg.

Mr. Quirsfeld proposed for active membership:

James T. Farrelly, Jr., 910 Jackson Ave., Bronx.

On motion duly seconded and carried, the by-laws were suspended and both candidates immediately elected.



Dr. Bequaert spoke in behalf of the publishers of the Zoölogical Record, stating that unless pecuniary aid were forthcoming, its publication would probably be suspended to the great detriment of science, especially entomology, which took a large part of each volume.

Mr. Davis mentioned the public assistance extended to some similar publications.

Mr. Sherman spoke against the Fordney Tariff Bill which would raise the cost of foreign publications to Americans 20 per cent.

Dr. Bequaert under the title "Wingless Hymenoptera with special reference to Mutillidæ" reviewed the advantages of the power of flight bestowed throughout the animal kingdom as a preliminary to the detailed consideration of the few cases in which special conditions made the absence of wings nevertheless desirable. Such conditions obtained in less than 1 per cent. of the Hymenoptera (omitting ants) and occurred occasionally in subterranean gall flies of burrowing habit and quite regularly in the females in the Mutillidæ and Thynnidæ. The life habits of these insects were then traced, the advantage of the wingless condition shown, as well as the concomitant modifications of thoracic structure. The much greater rarity of wingless males was mentioned and as instances thereof, the aquatic *Prestwittchia*, parasitic on water beetle eggs, and the fig insect were given. Comparisons with other orders, especially Diptera, were introduced, and complimentary reference made to the work on Wings of Diptera by Mario Bezzi. Dr. Bequaert being inclined to consider the flight power of Diptera superior.

In the discussion that followed Mr. Davis expressed admiration for the ability of Odonata to maintain long distance flight, citing their widespread distribution. Dr. Bequaert, however, thought the Diptera displayed, by use of halteres, far greater control, likening them to an aeroplane capable of entering a window, folding its wings and taking a seat in the room.

Various phases of the wingless condition in different orders were discussed by Dr. Sturtevant, Messrs. Notman, Davis, Dickerson, Johnson, Tee Van and other members, while the boxes of Mutillidæ brought by Dr. Bequaert were being passed around the room, bringing out the difficulty of correlating the sexes, the length of the ovipositor, etc.

#### MEETING OF JAN. 17.

A regular meeting of the New York Entomological Society was held at 8:00 P.M. on Jan. 17, 1922, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with 20 members present.

Dr. Sturtevant under the title "Fifteen Months in Central California" described the climate and life zones of the region, illustrating his remarks by maps, photographs, botanical and entomological specimens. His collecting had been principally in Diptera and had yielded a new species of *Drosophila*, males of a species of *Lonchoptera*, heretofore rarely found, and *Sinophthalmus pictus*. The localities visited included Pacific Grove, Palo Alto and the Sierra Nevada near Lake Tahoe.



Mr. Davis exhibited 69 named forms of "Ants of Staten Island and Vicinity" and read memoranda relating to collecting trips with Dr. Bequaert, Louis H. Joutel and Prof. W. M. Wheeler, referring in passing to the latter's naming a form with 8 or 9 hairs on its head as "*davisi*."

Dr. Bequaert pointed out that of the 69 forms shown

- 7 belong to Dolichoderinae
- 4 belong to Ponerinae
- 25 belong to Myrmecinae
- 33 belong to Formicinae

and that *Lasius niger* was not only the most abundant ant but perhaps the commonest of all insects. Various other facts were discussed by the speakers, Messrs. Davis and Bequaert, and by the members present, especially the attraction of young poplar glands.

Mr. Hall called attention to *Argynnis nokomis* collected by O. C. Poling, Bishop, Inyo Co., Cal., and the danger of its being exterminated by sheep pastured in their breeding places.

It was announced that the collection of Dr. A. Fenyés was in part offered for sale.

Mr. Leng spoke of a recent visit to Mr. Gustav Beyer, who has recently acquired a collection of about 1,700 species of Exotic Buprestidæ.

#### MEETING OF FEB. 7.

A regular meeting of the New York Entomological Society was held at 8:00 P.M. on Feb. 7, 1922, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with 22 members and four visitors present.

Mr. Henry Bird read a paper, illustrated by specimens of the species referred to and of their work, on "Some Adaptations of Indigenous Parasites to Introduced Pests."

The trend of the paper is to show the effort nature stands ready to make in restoring a proper balance, as shown where the European apple pest, *Hemerophila pariana*, recently gaining a foot-hold near New York City, is assailed by many native parasites even though we have no generic relative of this moth in our fauna. These are hymenopterous species, developing in the pupal stage, and for the season of 1921, at Rye, N. Y., their activities and whatever other causes may have worked in unison were sufficient to cause a decline in numbers of the final over the earlier broods. Attention was also called, through information from Dr. Aldrich, to a native Muscoid parasite, *Masicera senilis*, assailing the European Corn Borer in New England and to the fact that this cosmopolitan fly is a chief parasite of the Corn Borer in Europe. The wide dispersal of *senilis* in this country had been worked out by the speaker in extended breedings of very different boring larvæ.

Mr. Weiss read a paper on "Insects of a Moist Woods in the New Jersey Piedmont Plain," which will be printed elsewhere in full. The paper was il-

illustrated by specimens of the 688 species of insects considered, by maps of the State showing the geographical and faunal character of the area selected and by numerous photographs. It was shown that with scarcely one exception, the injury due to the insects was negligible; and that a preponderance of phytophagous insects in the more open thickets was replaced in the woods by an increased number of insects related to decaying vegetation.

In reply to a question from Mr. Taylor, present as a visitor, Mr. Weiss said the tension zone was not specially indicated by the insects occurring therein.

In connection with Mr. Weiss's paper, the disappearance of red cedar was discussed by Messrs. Nicolay, Davis, Olsen and Woodruff.

Mr. Groth congratulated the Society on the progress made since he first became a member, more than 30 years ago, and gave some interesting reminiscences of the hand-painting on early plates of slug-moth larvæ, of the dinners formerly held, and noted with pleasure that the Society was carrying on just the same now as then.

#### MEETING OF FEBRUARY 21.

A regular meeting of the New York Entomological Society was held at 8 P.M. on Feb. 21, 1922, in the American Museum of Natural History. Mr. Wm. T. Davis in the chair, with 18 members and two visitors present.

Dr. Lutz spoke of "Altitude in Colorado and Geographic Distribution" pointing out that the distribution data for insects were so much less known or published than those for plants that he was obliged to use the latter in his studies. The usefulness of the zonal names proposed by Merriam was admitted but their ambiguity as compared with a designation derived from the average latitude was pointed out. This paper will be printed in full in the Bulletin of the American Museum of Natural History.

Mr. Notman spoke of "*Pseudomorpha* in this Country and Australia" exhibiting a remarkable collection of that and allied genera of beetles and discussing their characters and habits in minute detail. His paper will also be printed in full.

Mr. C. E. Olsen exhibited *Psychomorpha epimenis*, hatched indoors February 21, 1922.

Mr. J. W. Angell exhibited the following beetles, viz.: *Necrophilus pectiti* found at Cook's Falls, Delaware Co., N. Y., September, 1921.

*Dorcus nanus* Csy. found at Lakehurst, N. J., Aug. 15, 1914, by F. M. Schott.

*Platycerus quercus* v. *iowanus* Csy. found in Catskill Mts., N. Y., by A. S. Nicolay, each of these extending the published distribution. Society adjourned.

#### MEETING OF MARCH 7.

A regular meeting of the New York Entomological Society was held at 8 P.M. on March 7, 1922, in the American Museum of Natural History,

Pres. John D. Sherman, Jr., in the chair, with 11 members and one visitor present.

Dr. Bequaert spoke on "Problems of African Insect Distribution as exemplified by Ants." He said that in studying the geographical distribution of plants or animals, either the causes which produce the differences in the faunas and floras of various parts of the world, or the correlation between the organisms occurring in a certain region and their environment, may be investigated. In either case a taxonomic census of the various forms of life is the first step to be taken. As the method of investigation in this branch of natural history is chiefly comparative, it is of the utmost importance that our knowledge of the faunas and floras of all parts of the world be progressing at about the same pace. In this connection the study of the African fauna by the American Museum of Natural History, under the inspiration and with the support of President Henry Fairfield Osborn, is of especial value. The latest Museum contribution to the zoölogy of the Belgian Congo is an extensive report on the ants by Professor William Morton Wheeler. The first part of his paper has now appeared and from it were taken the data presented by Dr. Bequaert. Investigation of the many fauna of Africa has been carried on mostly during the last three decades. Della Torre's Catalogue of Formicidæ published in 1890 recorded 228 species for the Ethiopian and 119 for the Malagasy region, while in 1920 these figures became respectively 920 and 237, according to Professor Wheeler's calculations. Counting various varieties and subspecies, 1,850 forms of ants have been described so far from the Ethiopian region. Of the 269 genera of ants known at present, 90 occur in the Ethiopian region, 34 of these being endemic there; most of the other African genera being found also in the Malagasy, Indomalayan, Papuan and Australian regions. The relations of the Ethiopian ant fauna with that of the Palearctic, Nearctic and Neotropic regions are very slight. It is especially worthy of mention that the Ethiopian region has only 22 genera in common with the Neotropical, and these are mostly of cosmopolitan or "tramp" forms. Dr. Bequaert showed a series of maps, from Professor Wheeler's report, illustrating various types of distribution represented by Ethiopian ants. Of the genera endemic in that part of the world some range over the entire Ethiopian region (*Paltothyreus*, *Megaponera*, *Plectroctena* and *Atopomyrmex*), others are seemingly restricted to the Savannah country of the Sudan, and east and south Africa (*Messor* and *Ocymyrmex*), and still others occur in the West African Rain Forest (*Macromischoides*, *Psalidomyrmex*, *Engramma* and *Phrynoponera*). *Pachysima* is peculiar in being found only inside the branches of certain plants of the genus *Barteria*, which is not known outside of the West African Forest Province.

Mr. Nicolay gave some "Notes on Beetles of Washington, D. C.," showing especially Cleridae including rare and interesting species, with an account of his experiences on many collecting trips.

Mr. Angell called attention to the capture by Mr. Lesieski of *Hydrobius tessellatus* at Cluson Point.

## MEETING OF MARCH 21.

A regular meeting of the New York Entomological Society was held on March 21, 1922, at 8 P.M., in the American Museum of Natural History. Pres. John D. Sherman, Jr., in the chair, with 16 members present.

Dr. Lutz reported his visit to Ithaca, which incidentally involved discussion of New York State List of Insects.

Mr. Barber exhibited a box of Hemiptera-Heteroptera collected by the Iowa State University Expedition to the West Indian Islands of Antigua and Barbadoes in the summer of 1918. The following families only were represented: Coreidae, Lygaeidae, Pyrrhocoridae, Reduviidae and Tingidae. Some of the species were represented by long series.

In his remarks concerning the twenty-one species represented, he spoke of the geographical range of each; mentioning the fact that the far greater number, 13, had a very wide range, most of them extending from South America to the southern United States. Only five were apparently endemic to the West Indies. He also spoke of the great preponderance of South American forms in the Lesser Antilles and noted some of the probable causes of their appearance there.

In the discussion which followed, Dr. Lutz, Dr. Bequaert, Messrs. Barber, Mutchler, Davis and Leng commented on the high state of cultivation in Barbados and the element of human introduction of sugar, cotton, banana, etc., as being important in considering West Indian distribution problems, especially where plants were transported with balls of earth attached.

Mr. Weiss having taken the chair, Mr. Sherman exhibited a 12-page pamphlet, hitherto overlooked by bibliographers, by Major John Leconte, entitled "List of the Coleopterous Insects of Georgia," published in 1849 as part of a volume of White's "Statistics of Georgia." The list enumerates 1,206 species, comparing therefore favorably with many lists in other departments of zoölogy, which have been similarly overlooked, and is a remarkable instance of the difficulty of obtaining a complete history of past events.

Mr. Davis exhibited "Some Insects from Virginia" showing five boxes of Orthoptera, 76 species, of which a list will be published later, and one box of miscellaneous insects. His remarks on his experiences in collecting them covered the songs of many, the preservation of their colors and methods of collecting.

For the benefit of those desiring Russian correspondents, the address of the Permanent Bureau of all Russian Entomologists was recorded as Litayny, 37/39, Room 59. Petrograd, Acting President, Prof. N. Bogdanovkatzkov.

## MEETING OF APRIL 4.

A regular meeting of the New York Entomological Society was held at 8 P.M., on April 4, 1922, in the American Museum of Natural History; Pres. John D. Sherman, Jr., in the chair, with 19 members and one visitor present.

Mr. Davis reported injury to Mrs. Slosson from a fall, resulting in a broken rib. He also exhibited a bound volume of Henry Bird's papers.

Mr. Notman spoke of "Distribution of some species of *Bembidion* in New York State" pointing out the occurrence of *nitidum* and *4-maculatum* in dry places, *contractum* at the seashore, as striking and well-known examples of limited distribution, and then taking up the distribution as he had established it at fourteen stations of *fugax*, *planum*, *grandiceps*, *planiusculum*, *simplex*, *complanulum* and *picipes*, allied species living under stones at the edge of water, the more subaquatic species being placed first. He gave incidentally, interesting details of the habits of some other species saying, for instance, that while many probably rarely come out into daylight, others like *confusum* and *chalceum* are active on sandbars, flying in the sunshine like *Cicindela*.

Mr. Leng exhibited *Cicindela nevadica* and *Knausi* and read a communication relating thereto from Mr. Knaus.

Mr. Comstock spoke of Entomology in Baltimore, especially of Maryland Academy of Sciences and Johns Hopkins University.

Mr. Woodruff spoke briefly of his theatrical experiences.

Dr. Sturtevant spoke of a remarkable Dolichopodid recently found on the Pacific with part of the trophi heavily chitinized and simulating mandibles to be hereafter described by Messrs. Aldrich and Snodgrass.

Mr. Weiss called attention to a valuable bulletin, No. 986, U. S. Dept. of Agriculture, "Studies on the Biology and Control of Chiggers," by H. E. Ewing, and to a popular article in Radio News for Feb. 1922, "Do Insects talk by Wireless," by Raymond F. Yates.

Mr. Davis exhibited some South African Cicadas in the Museum collection, giving some results of his studies thereon.

#### MEETING OF APRIL 18.

A regular meeting of the New York Entomological Society was held at 8:00 P.M. on April 18 in the American Museum of Natural History; Pres. John D. Sherman, Jr., in the chair, with 16 members and two visitors, Mr. Sherman of N. Y. U. and Mr. Hatch of Syracuse University, present.

Announcement was made from Dr. Felt's address by radio from Schenectady on April 24.

Mr. Davis exhibited "Insects collected along Potomac River" when with Messrs. Shoemaker and Nicolay in September 1921. Four pints of Cave Crickets, *Cychnus*, etc., were taken in traps and more *Cychnus* under stones, besides many other interesting Carabidae.

Some episodes related to finding *Catocala* under sewer pipe, *Bombus impatiens* in coitu, wood thrush singing in Georgetown while trolley car passed by, the excellence of papaw and persimmon, the songs of Cicadas, etc.

Mr. Notman exhibited three *Pachyta rugipennis* and five *Anthophilax malachiticus* collected June 9, 1920, at Keene Heights, Essex Co., N. Y., in the vicinity of dead spruce.

Mr. Nicolay exhibited an article from the Brooklyn "Eagle" in reference to some remarks by Mr. Weeks and Mr. Davis' comments thereon;

and showed also some photographs of trips on Long Island with Messrs. Notman and Davis.

Mr. Barber exhibited local Tingidæ collected by Messrs. Dickerson and Weiss.

Mr. Weiss showed four old pamphlets

Sprague's 1871 compilation of Randall's Species of Coleoptera.

Directions for preparing Bibliographical Record, Psyche, 1879.

Directions for the collection of Coleoptera by Geo. Dimmock, 1872.

Geo. Dimmock's Cat. of Coleop. & Lepid. 1871.

Messrs. Hatch and Sherman, present as visitors, briefly addressed the Society, which, after a general discussion of books and collecting trips, adjourned.

#### MEETING OF MAY 2.

A regular meeting of the New York Entomological Society was held at 8:00 P.M. on May 2, 1922, in the American Museum of Natural History. Vice-pres. Harry B. Weiss in the chair, with 15 members and one visitor present.

Previous to the opening of the meeting the members enjoyed refreshments provided by Mr. Davis.

Mr. Davis read greeting from Dr. Bequaert dated Plymouth, April 16th, and showed photographs of Messrs. Good, Sherman and Hatch, recent visitors at meetings.

On motion by Mr. Bird, the thanks of the Society were voted to Mr. Davis for the repast provided earlier in the evening.

Mr. Notman showed his collection of the genus *Elaphrus*, containing all the eastern species. He also spoke at length of the Staphylinid genus *Osorius*, exhibiting a collection from Paraguay, Mexico, West Indies, etc., partly borrowed from the U. S. Nat. Museum, pointing out the tropical distribution of most of the species, their structural characters and their fossorial adaptations. He said that the material exhibited indicated 16 new species and 2 new genera. In the discussion that followed Mr. Nicolay added some details of localities for *Elaphrus*.

Mr. Mutchler having taken the chair, Mr. Weiss spoke of "Pontedera's 1718 Paper on Cicada" exhibiting photographic reproduction of the original and tracing thereby the error of Jaeger and others as to the number of years some species live under ground. This paper will be published in full.

Mr. Weiss also called attention to newspaper stories comparing radio and insects.

Mr. Davis exhibited a Chinese cage for grasshoppers to be used in providing live food for cage birds, given to him by Miss Taft of the New York Times.

Mr. Mutchler spoke of recent visitors at the American Museum of Natural History, Mr. Fred Muir of Honolulu, on his way to England, to



visit his aged father-in-law, Dr. David Sharp, Mr. A. B. Wolcott of Porto Rico, etc.

MEETING OF MAY 16.

A regular meeting of the New York Entomological Society was held at 8 P.M., on May 16th, 1922, in the American Museum of Natural History, Pres. John D. Sherman, Jr., in the chair, with 16 members and eight visitors present.

Mr. Shoemaker exhibited eight boxes of Chrysomelidae and a number of rare and interesting moths allied to *Nacophora quernaria*. He called attention to the work of Hulst and that of Moffatt on the moths shown and to that of Knab on the Chrysomelid beetles of the genus *Calligrapha* in relation to the specimens shown.

Mr. Mutchler spoke first of the beginning of the automobile journey to Colorado by Dr. Lutz and Mr. Sievers, showing postal cards received by him from various places as far west as Indiana. He also exhibited for Mr. Watson a remarkable bug from the Philippine Islands.

Mr. Mutchler then spoke in conjunction with Mr. Weiss on "Economic Species of *Agrilus* in New Jersey" of which a new key based on obvious characters will be printed by New Jersey Agricultural Dept.; 21 species were discussed with reference to their food plant, the damage done, and the character of the workings of the larva.

Mr. Engelhardt gave an interesting account of his visit to Mobile, Ala., and collecting experiences with Mr. Loding, Dr. Van Aller and Mr. Dukes, during which he visited the coastal swamp at Gulfport, Miss., the cypress swamp at Bayou Chippewa, and the higher country about Spring Hill. He visited by auto the localities where the extensive cultivation of pecan nuts and Satsuma oranges is being encouraged to replace the damage to the cotton crop done by the boll weevil and ended his trip at the Florida State Museum at Gainesville, after visiting at St. Petersburg, Fla., with George Franck, whom he found at 80 years of age, somewhat feeble.

Mr. Sherman spoke of his recent visit to Washington, of Colonel Casey's forthcoming Memoirs X devoted to South American Barini, of Dr. Howard, W. M. Mann and Dr. Schwarz. In reference to the list of beetles of Georgia published in White's "Statistics of Georgia" he said Dr. Schwarz had discovered that its author was neither John Eaton Leconte nor John Lawrence Leconte, but a cousin of the latter, having the same initials.



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# JOURNAL

OF THE

## New York Entomological Society.

Published quarterly by the Society, at Prince & Lemon Sts., Lancaster, Pa., and New York City. All communications relating to the JOURNAL should be sent to the Publication Committee, New York Entomological Society, American Museum of Natural History, New York City; all subscriptions to the Treasurer, Wm. T. Davis, 146 Stuyvesant Place, New Brighton, Staten Is., New York, and all books and pamphlets to the Librarian, Frank E. Watson, American Museum of Natural History, New York City. Terms for subscription, \$2.00 per year, strictly in advance. *Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY*

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THE  
NEW YORK ENTOMOLOGICAL SOCIETY

Organized June 29, 1892.—Incorporated June 7, 1893.

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The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

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